

THE
A B C
OF
PHOTOGRAPHY

THE
LONDON
STEREOSCOPIC
COMPANY





C. 1895

I. AR

24TH EDITION, REVISED AND GREATLY ENLARGED.

THE
A B C
OF
MODERN (DRY PLATE)
PHOTOGRAPHY.

THE LONDON STEREOSCOPIC AND PHOTOGRAPHIC
COMPANY, LIMITED,

106 & 108, REGENT ST., W., AND 54, CHEAPSIDE, E.C.

PRINTED BY
THE LONDON STEREOSCOPIC & PHOTOGRAPHIC COMPANY, LIMITED,
54, CHEAPSIDE, E.C., AND NEW SOUTHGATE, N.

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EXTRACT FROM "OUR VIEWS" OF THE *Amateur Photographer*.

"The thanks of the Amateur Photographic World are undoubtedly due to the Company for their untiring enterprise.

INTRODUCTION

TO THE TWENTY-FOURTH EDITION.



THE success which attended the last edition of the A B C has led us (the London Stereoscopic and Photographic Company, Limited), to again enlarge the work by a Part 3, which contains useful formulæ and suggestions which will, doubtless, be of service to those who follow the Art-Science of Photography. As in past editions, the fault of most text books has been studiously avoided by the employment of simple language, instead of technicalities which only experienced photographers can understand.

It is needless to repeat what has been said in previous editions, as to the many advantages modern

photography can claim as compared with the "black art" which it has superseded, but there are one or two points which may be touched upon.

Formerly it was necessary, for those who wished to develop their negatives when abroad, to carry a quantity of bottles and more or less bulky packages of material; now the traveller can carry all that is required in a very small compass, in the form of cartridges containing developers, fixing and toning baths, &c., thus obviating the use of bottles and the consequent risk of breakage.

The improvement in films has also made considerable progress, so that travellers can now carry with them several gross packed in with other impedimenta, and be sure of negatives, as good as on glass if used rightly; and, in cases where halation is feared, films are superior.

All cameras are now made with so much skill that the merest tyro can easily take a photograph, after being once shown how to work the instrument, and the further stages of development are so simple, yet so fascinating, that it is no cause for wonder that so many thousands are now ardent photo-

graphers, and it is a common belief that no one in the future will consider his home complete without a camera.

The first part of this book is written for those who know nothing whatever of Photography, and a careful perusal will be sufficient for any one with average intelligence to take a presentable photograph. It may be added here, that The London Stereoscopic Company give *free lessons* to their customers, and invite those living in the country to at once write, in case they meet with any difficulty and wish for assistance or advice. Lessons can also be given at customers' residences, or in advanced photography, on terms which can be arranged with the Manager of the Amateur Department, 106 & 108, Regent Street, W., or 54, Cheapside, E.C.

The second part is rather more advanced, and contains many useful notes for those who are proficient; the third part is devoted to formulæ and general hints as to procedure in cases of difficulty.

Several new cameras are described at length, and it may be observed that intending purchasers have

the advantage of personally trying, by visiting the Studios of the Company, what the selected apparatus will do before actually deciding, and, in addition, they have the assistance of experienced practical photographers to guide them in their choice.

In 1858, the first edition of the "A B C of Photography" was published, and attention is called to the fact that the title is the property of the London Stereoscopic Company, and for others to copy it is merely an attempt to mislead.

THE LONDON STEREOSCOPIC AND
PHOTOGRAPHIC COMPANY,
LIMITED.

*106 & 108, Regent Street, W.,
and 54, Cheapside, E.C.*

The ABC of Photography.

PART I.

CHOICE OF APPARATUS.



HIS is, of course, the first matter of importance, and the beginner is cautioned against the false economy of purchasing second-hand apparatus.

Experience has proved that, considering the cost of repairs, which are, in most cases, highly necessary, and also the vexation occasioned to the amateur by not being able to obtain the results he anticipated, owing to the apparatus being shaky and without the many improvements now made, he will eventually either discontinue the practice of photography, or, discarding the second-hand apparatus purchase an entirely new outfit. Therefore we wish to urge the intending beginner to go to some well-known house and purchase new and good apparatus, which will aid him very materially in his efforts to become a successful amateur photographer.

The intending photographer should first decide whether he requires a camera to be used upon a tripod stand, or whether one of the many excellent hand cameras will best suit his purpose; and, if he be absolutely inexperienced in the matter, it is a wise proceeding to have one or two elementary lessons (which are free to purchasers) at the Regent

Street Studio of the Stereoscopic Company, before finally choosing an instrument.

The London Stereoscopic Company make up complete sets of apparatus, which are most excellent, and are so inexpensive as to be within the range of all.

It is a trite saying that "a bad workman quarrels with his tools;" but it is no less a fact that good photographs cannot be produced with badly-made apparatus. The wood of the camera must be well seasoned, or it will warp with the inevitable exposure to weather which it must of necessity experience. It must also be so carefully designed that it remains absolutely rigid when used, and so neatly made that it is perfectly light-tight. These conditions can only be secured by the employment of first-class materials, and experienced workmen to deal with those materials. The Company can guarantee that the apparatus which they offer will fulfil most thoroughly all the requirements of the photographic worker. The beginner can either purchase a complete set of apparatus, comprising everything required, or he can procure the articles separately.

APPARATUS NECESSARY.

See fig. 1, page 4.

1. Camera.
2. Lens.
3. Tripod Stand.
4. Focussing Cloth.
5. Four Ebonite Dishes (these are lightest and most portable).
6. About two dozen Dry Plates.

7. A Ruby Lamp, or Ruby Fabric, for Dark Room.
8. Two or three Graduated Measures.
9. Developing Solutions.
10. Hyposulphite of Soda.

The different sizes of cameras which are sold are indicated by the size of the largest picture which they will take. But it may here be noted—and this is a circumstance not generally brought to the attention of purchasers—that a large camera may be made, by an inexpensive addition called a “carrier,” to take small pictures. This is of great advantage to a beginner, who can try his ’prentice hand at small work before he essays to attempt pictures of the largest size that his camera will afford. He can thus not only economise his plates, but take negatives suitable for after-use as lantern-slides.

The following are the standard sizes of cameras, the figures indicating the maximum size of the picture which each will take :—

Inches.

$4\frac{1}{4} \times 3\frac{1}{4}$	Known as “quarter-plate” size.
5×4	
$6\frac{1}{2} \times 4\frac{3}{4}$	Known as “half-plate” size.
$7\frac{1}{2} \times 5$	
8×5	
$8\frac{1}{2} \times 6\frac{1}{2}$	Known as “whole-plate” size.
10×8	
12×10	
15×12	
20×16	

&c.

It may here be noted, that recent improvements in camera construction have so reduced the bulk and weight of the larger sized cameras, that even a 15×12 apparatus may easily be carried by one person. This, in conjunction with the introduction of celluloid films, greatly facilitates the production of large direct negatives.

The purchaser is earnestly advised to see the various sizes for himself. At the Company's studio he can also see prize pictures from various exhibitions taken on every size of plate. We append a cut of a camera (fig. 2), which represents a singularly complete form of apparatus. To the lens is attached a "shutter" for taking instantaneous pictures (described later on), and on the top of the camera is a "finder." This useful addition to the camera gives a miniature view of the scene which is covered by the larger lens below, so that the

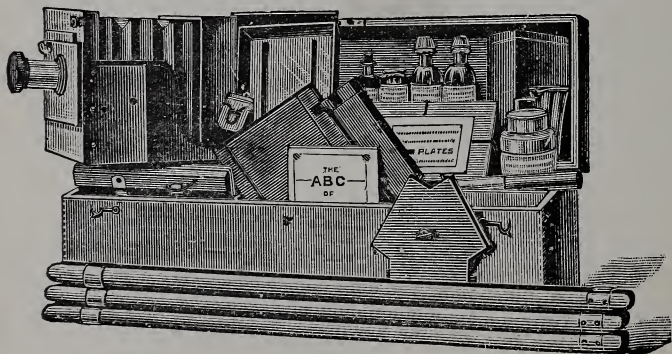


Fig. 1.—Photographic Outfit.

operator can take his picture at the precise moment when any moving object is in the field of view.

The entire apparatus required for taking a number of pictures is so very compact, and so much ingenuity has been exerted in reducing the bulk of all articles to the lowest limit, that the photographic tourist is not impeded by a number of extra packages. Indeed, an ordinary Gladstone bag will not only carry his apparatus, but his personal belongings as well.

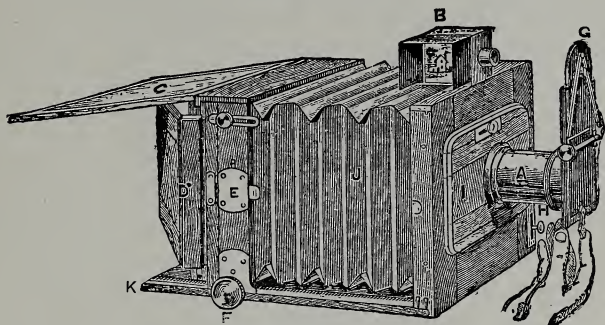


Fig. 2.

For those who desire a tent arrangement in which their gelatine plates can receive that treatment called "development," which turns them into pictures, the "Company's" developing and changing tent may be recommended. It forms, when packed, an ordinary box about the size of a small portmanteau (see fig. 3, page 6).

Those who attempt photography in high latitudes, at a season of the year when the sun never sets, will find some arrangement of this kind almost indispensable. In Norway, for instance, during the summer months, a dark room is almost an impossible thing to secure. With this tent the tourist carries

his own dark room with him. The illustration below shows the tent in actual use.

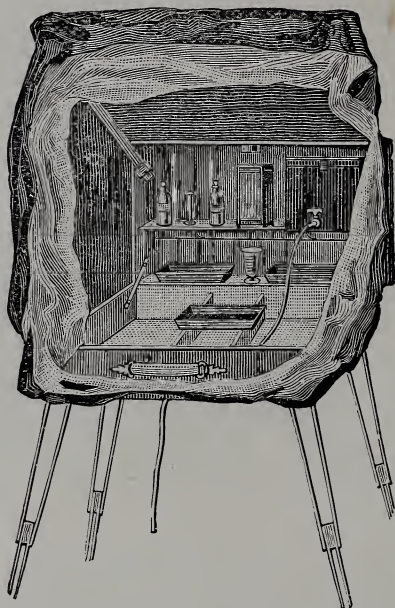


Fig. 3.—The Stereoscopic Company's Developing Tent.

THE DARK ROOM.

IF the before mentioned tent be not adopted, it is necessary and desirable that the photographer should have at home a dark room, in which various operations are conducted connected with the art. If a room can be set apart for this purpose, so much the better; and a very small room or spacious

cupboard is quite sufficient for the requirements of the amateur. But any room can be rendered serviceable, if the precaution be taken to shut out white light, and to replace it by red light, which latter exerts no action upon the sensitive chemicals employed. A light frame-work of wood should be made to fit into the window of the room, this frame being covered with two thicknesses of the material known as ruby fabric. A still simpler plan, if a cupboard or room without a window is the only

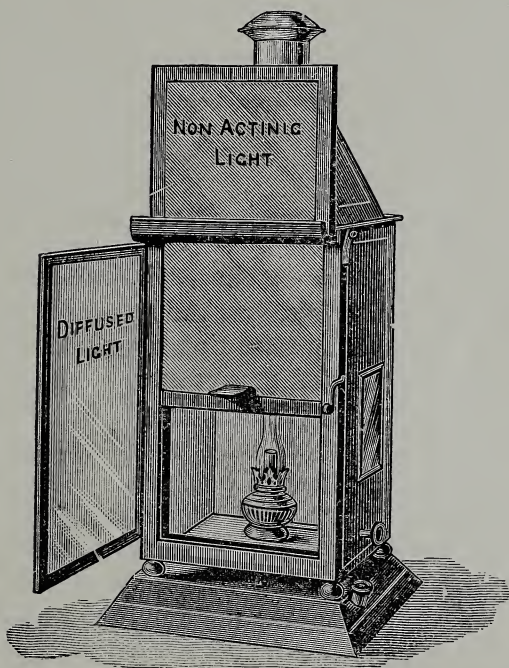


Fig. 4.—Dark Room Lantern.

place available, is to employ a red lamp like the one shown on page 7. A water-tap with a basin and waste-pipe is a desideratum, but if these are not accessible, a hand-basin and can of water will suffice.

Whichever method be adopted, the greatest care must be taken that no crack or chink, through which white light may enter the room, must be left uncovered. The area of the red window should not exceed two square feet. It is safer to cover the remainder of the window with stout brown paper or other opaque material.

MAKING THE NEGATIVE.

WE now come to the actual commencement of operations, viz., the first attempt of the beginner to take a photograph.

The first matter of importance is to select the subject to be photographed, and here we would advise a simple subject, such as the exterior of a house, or a view from a window. Care must be taken that the light is behind or at the side of the camera and falling directly upon the subject; on no account must the camera be placed so that the sun shines into the lens. Having fixed the camera upon the tripod stand, throw partly over the instrument and partly over the head the focussing cloth: this

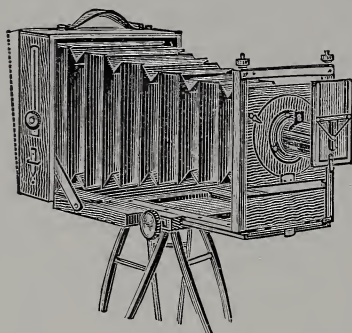
will enable the image to be seen upon the ground glass at the back of the camera.

The image as thus seen is deceptive. It is inverted, for the rays of light in passing through a lens cross one another. The beginner will find little difficulty on this score, for his eyes will soon become accustomed to it. All objects are portrayed in their natural colours on the ground-glass screen of the camera, and look very different when translated into monochrome in the subsequent photograph. The beginner must be cautioned not to choose subjects for photographing which depend for their beauty more upon the contrast of colours which they exhibit than upon form. This is especially true of wide expanses of open flat country, which look beautiful enough on the focussing screen, but usually make disappointing photographs.

HOW TO FOCUS.

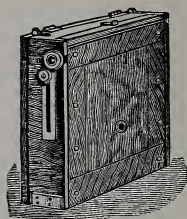
To adjust the focus, use the screw which is generally at the back or side of the instrument, turning it backwards or forwards until the image is quite sharp or distinct upon the ground glass. It is best to select some prominent object in the centre of the picture, and to endeavour to get that as sharply defined upon the ground-glass screen as possible. This focussing operation should be performed with the full aperture of the lens, *i.e.*, with no stop or diaphragm inserted in the slit in the brass mount. But, when once a satisfactory focus has been obtained, the operator should insert one of these stops, which will not only

increase the sharpness of definition, but will correct a certain tendency to indistinctness at the edges of



Open.

Figs. 5 and 6.—The Camera.



Closed.

the picture. The smaller the stop used, the longer must the exposure be ; and the beginner cannot do better than work with a medium-sized stop (say that marked F16), and use no other. By this means he will be able, after some little practice, to produce a picture with some certainty that it has received the correct exposure.

CHARGING THE DARK SLIDE.

Now proceed to the dark room, and, by the aid of the ruby light, open a box of plates. Upon carefully examining them it will be noticed that one side is coated with a thin white film, the opposite side being plain glass. Open the double dark slide and place one plate inside, film downwards, covering it

with the piece of blackened tin, which will be found in the slide, on the top of which place another plate, face uppermost; thus the plates will be back to back, with the blackened tin inserted between them, after which the slides must be carefully shut, and the box containing the plates closed. There will always be a partition between the plates whatever the construction of the dark slide may be. During the filling of the slides very great care must be taken that no white light gets to the plates; as the sudden opening of the dark room door, or, in fact, the slightest admission of daylight, would effectually spoil the whole batch, rendering them perfectly useless. The result would be what is technically known as "fog."

Flexible negative films are placed in the dark slides in exactly the same way as described for plates. It is, however, necessary to back them up with a piece of stout cardboard, or, better still, to use the film carriers made specially for the purpose.

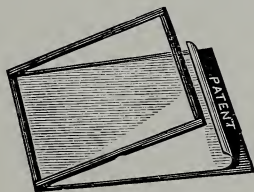


Fig. 7.—The Company's Film Carrier.

Tourists have to charge their dark slides at night, generally in their hotel bedroom. With a portable

red lamp, which will fold up flat for packing, this necessary operation presents no difficulty whatever.

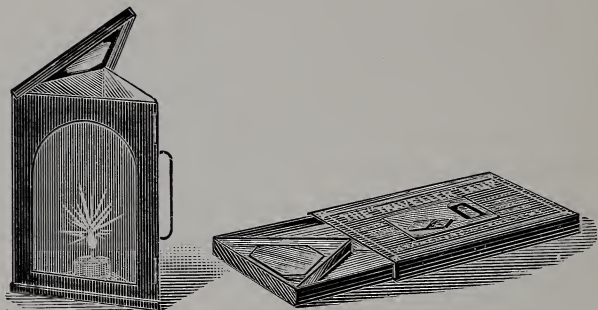


Fig. 8.—The Company's Folding Dark Room Lamp.

PREPARATIONS FOR EXPOSURE.

Shut the plate-box and proceed to the camera ; fold back the ground glass and insert the slide in the grooves formed for the purpose, and, capping the lens so that all light is excluded, draw the shutter of the dark slide, keeping it carefully covered with the focussing-cloth. Everything is now ready—good light, picture sharp, cap on lens, stop in lens, slide in camera and opened ; all this done, nothing now remains but to uncap the lens for the time necessary to secure a photograph.

TIME OF EXPOSURE.

No hard-and-fast rule can be laid down as an absolute guarantee of certain and correct exposure, but, with ordinary conditions, about one second should be quite sufficient. The exposure is made by gently removing the cap from the lens for the

space of time already mentioned, *care being taken in removing the cap not to jerk the camera*. Having yet another plate, it can be exposed (after replacing the cap) by closing the slide, taking it out of the camera and reversing it.

We would here note a great advantage that dry plates possess over the old "wet process," viz., their keeping qualities, it not being at all necessary to *develop them upon the spot*, as they will be quite as good if left untouched (but carefully preserved from the light and damp) for months. But if the beginner avails himself of this privilege, it will be advisable to number the negatives, and use a note-book, which is so arranged that a correct record can be kept of all exposures, and memoranda made of conditions of light, &c. This is highly necessary, as, supposing the student to have three dozen plates, and the first should prove, when developed, to be under or over exposed, he can, by reference to his note-book, see if the remainder are likely to be the same; and if such should be the case, he may, by judicious modification of the developer, make his plates perfect.

Gelatine plates are now sold of various degrees of rapidity. The beginner should perfect himself in the use of slow ones, or, at any rate, he should use those of a moderate degree of rapidity, and afterwards he can employ those used for instantaneous effects, and with which a moving train, and even a flash of forked lightning, can be secured in the camera. The Stereoscopic Company's "Black Band" plates are sold in two rapidities.

DEVELOPMENT.

THE next process is the development. Many amateurs are under the impression that this is a most tedious and difficult operation, but by carefully following the rules enumerated below success is certain.

There are many formulæ for developing, but we append one which will be found to give results equal to any, and which possesses the advantage of extreme simplicity. Make as follows:—

No. 1.

Liquor Ammonia 880°	...	...	1½ oz.
Bromide of Potassium	...	...	1 oz.
Water...	...	...	6½ oz.

No. 2.

Citric Acid	...	...	...	...	¼ oz.
Water	...	...	...	...	8 oz.
When dissolved add Pyrogallic Acid					1 oz.

The above are stock solutions, and should be labelled Nos. 1 and 2.

Now obtain two 16-oz. bottles, take one ounce of No. 1 stock solution and put it into one of the bottles, and fill it up with water, labelling it "A," and do the same with No. 2, calling it "B."*

We will suppose it is an ordinary "half-plate" we wish to develop, and that we are to use the Pyro-Ammonia developer just described. Having prepared the solutions as above, we take a graduated

* Concentrated Developers of great excellence are sold by the Company, ready for use.

measure, and putting equal parts of A and B (one ounce of each) into it, should next open our slide, and placing the plate, film uppermost, in an ebonite tray, pour quickly over it the solution from the measure, taking care that it flows all over at once.

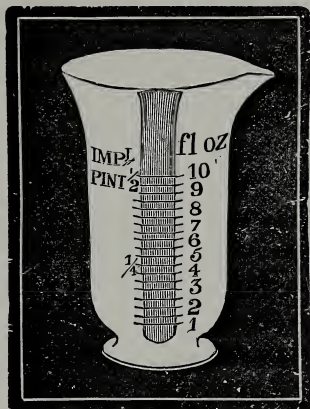


Fig. 9.—Graduated Measure.

Be careful to scan the surface of the plate for air-bubbles, which, if allowed to remain, will turn into white, clear spots on the negative. A broad camel's hair brush should be kept within reach to remove such unwelcome intruders. Care must be taken, too, *to wash out every vessel* used for development before a fresh plate is operated upon.

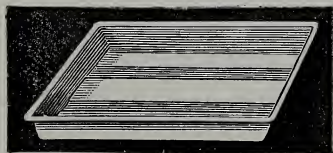


Fig. 10.—Developing Tray.

TIME OF DEVELOPMENT.

If properly exposed, the picture should appear in about 10 to 15 seconds, but the development should be continued for the space of from four to five minutes. It is as well to keep the solutions, while on the plate, constantly moving, to prevent unequal action and any particles of dust from settling on the plate and causing spots. The negative is properly and sufficiently developed, when those parts of the picture which were white in the original are almost perfectly opaque in the negative—the darkest shadows remaining yellowish and unaltered under the influence of the developing solution, while the gradations of tone are fully preserved.

The development of a plate which has been properly exposed is a much more simple matter than would appear by the description—indeed, it is almost difficult to utterly spoil a picture which has been properly timed; on the other hand, no amount of verbal instruction will perfectly prepare the amateur for meeting and overcoming the difficulties of over and under-exposed negatives; still, there are one or two facts the knowledge of which, with a little practice and a few failures, will be of great service to him.

Negatives which have been very much under-exposed are useless; the contrast of light and shade is too violent. In the vain attempt to bring detail into the shadows, the lights become too dense, and the longer the development the greater the failure; but when the time of exposure has not been much

too short, the picture may often be saved by using twice as much of A as of B. Thus, if three ounces of developer were wanted, it would be composed of two ounces of A, and one ounce of B.

A negative which has been greatly over-exposed, bursts into sight at once on the developing solution being applied, and the image gets fogged all over immediately, there being very little contrast. Do not, however, give the plate time to go as far as this. Directly it is seen that the image is showing too quickly, wash off the developer without delay and rinse with clean water. Now recommence developing, but alter the proportions of A and B. Take only one ounce of A to about two ounces of B. Of course, these are only approximate quantities, but the student will be surprised when he finds how quickly he can gauge the proper proportions to use.

Should it be desired to use soda as the alkali in the developer, instead of ammonia, an excellent formula will be found at the end of this book.

In cases where large numbers of negatives have to be developed, it is best to cover the tap with a piece of flannel, to prevent the possibility of the plate being injured by accidental contact with the metal.

After development, the plate should be well washed for two minutes. It may then be immersed in the

ALUM SOLUTION,

consisting of :—

Alum ...	...	...	...	...	2 OZ.
Water	...	...	...	...	20 OZ.

Let it remain in this bath for a minute or two, after

which take it out and wash it *well*, previous to putting it into the “fixing” or “clearing” solution. The alum bath is only necessary in hot weather, or if the negative is greatly stained.

FIXING OR CLEARING THE NEGATIVE.

Hyposulphite of Soda	...	...	5 oz.
Water	...	...	20 oz.

It will be noticed, previously to immersion in this solution, that the back of the plate is quite white, very little of the picture being perceptible when held up to the ruby light. The object of this bath is to clear away all the whiteness (unaltered bromide of silver) from the film, and to leave the picture only on the plate, sharp, clear and distinct. The plate

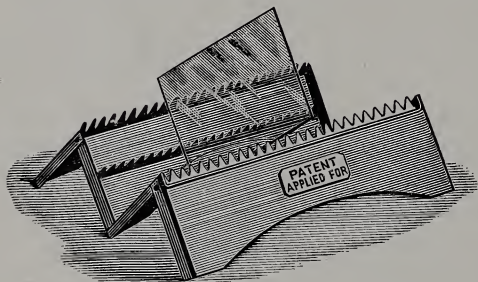


Fig. 11.—Plate Rack. Open.

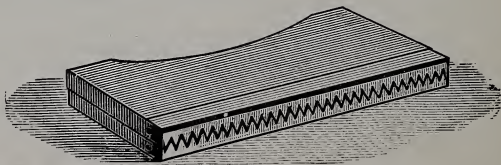


Fig. 12.—Plate Rack. Closed.

should not be left in this solution for less than ten minutes, and when taken out should be *washed under a tap most thoroughly*. If the washing be not thorough, the negative will run a risk of being destroyed. After this it can be laid in a deep dish, and treated to several changes of water, at intervals of about half an hour (this can be done in daylight), and placed upon a shelf or plate rack to dry (see figs. 11 and 12).

If a negative is required in a hurry, it may, after well washing, be immersed for five minutes in "methylated spirits," after which it will dry very quickly.

It should here be noted that it is best to pour out fresh A and B solution into the glass measure for each plate, but the alum and hyposulphite baths can be used until exhausted.

AN ALTERNATIVE METHOD OF DEVELOPMENT.

The developer described in the preceding pages, while excellent in use and capable of giving the finest results, has two shortcomings, one of them being the necessity for using fresh solution for each plate, while the other is a tendency to stain the fingers of the operator to a deep brown tint, which it is very difficult to remove. Neither of these objections apply to the *Hydrokinone Developer*. The same solution may be used for several plates in succession, and there will be no staining, either of negatives or fingers.

An excellent developer may be made as follows :—

B

Hydrokinone	...	...	...	80 grains
Sulphite of Soda	...	...	...	80 „
Bromide of Potassium	...	...	...	10 „
Citric Acid	...	...	...	10 „
Water	...	...	...	20 ounces.

A

Caustic Potash	...	...	...	160 grains.
Sulphite of Soda	...	...	...	160 „
Water	...	...	...	20 ounces.

To make a normal developer, equal parts of A and B should be mixed. The proportions of A and B may be varied for over and under exposure as directed for the Pyro and Ammonia developer. Developer which has been used for several plates, is excellent for over exposed pictures, while quite freshly mixed solutions should be used if under-exposure be suspected. This developer is somewhat slower in action than one containing Pyrogallic acid, but if sufficient time be allowed, will bring out the details of even the shortest exposures, without staining. It is excellent for developing pictures upon bromide paper, lantern slides, and opals. The Stereoscopic Company have, after many experiments, succeeded in making a Concentrated Hydrokinone Developer, which is ten times the above strength, and which only requires diluting with water for use.

After development, the plate should be immersed in the alum bath, then in the fixing bath ; washed, as

already directed, and allowed to dry spontaneously. On no account attempt to dry by heat, or the gelatine will melt off the glass.

Although we have given two standard methods of development, let it be borne in mind that the maker of the plates used may be presumed to know which developer will best suit them. His advice should, therefore, be followed.

FAILURES

AND THEIR REMEDIES.

1. LACK OF CONTRAST IN THE NEGATIVE.—Cause: over-exposure. The remedy is obvious, viz., expose less, but if the picture flashes up at once, add a little more of B to the developer.
2. THINNESS OF THE IMAGE may arise from two causes: 1st, too short a time in the developer; 2nd, over-exposure. Remedy: insertion in Intensifyer, as described on page 24.
3. TOO DENSE AN IMAGE.—Cause: too long an immersion in the developer. Remedy: The Ferridcyanide Reducer, as described on page 25.
4. THE FILM LEAVES THE EDGES OF PLATES.—Technically called “Frilling,” generally arises in hot weather. Remedy: insertion in Alum Solution, 1 oz. to 10 ozs. water, before and after fixing.

5. YELLOW OR FOGGY APPEARANCE OF NEGATIVE
—Caused by deposit or staining of the film, easily removed by placing it in the Solution of Alum and Hydrochloric Acid, see page 23 (for short time only, after fixing) ; to be well washed before and after.
6. POWDERY DEPOSIT UPON FILM WHEN DRY.—
Not properly washed. Hyposulphite of Soda deposit. The remedy is to rewash the plate well.
7. IN HOT CLIMATES, AND EVEN IN THIS COUNTRY IN VERY HOT WEATHER, THE FILM WILL SOMETIMES SHOW A TENDENCY TO BUBBLE UP AND SEPARATE FROM THE GLASS. This is an aggravated form of frilling, which will generally yield to Alum. If not, use a 10 per cent. solution of Chrome Alum, which is stronger in its action.
8. MINUTE SPOTS, OR PINHOLES, on the negative may be traced to dust on the plates. Remedy : Brush each plate with a flat camel-hair brush before its insertion in the dark slide, and again before placing it in the developing tray.
9. LARGER ROUND SPOTS are due to air-bubbles during development. The remedy has been already noted on page 15.
10. A GENERAL YELLOWNESS OF THE NEGATIVE, due often to forcing out of details during development, and consequent prolonging of that operation ; will generally disappear on application

of the following clearing solution—after fixing and washing :—

Alum (saturated solution) 1 pint.

Hydrochloric Acid $\frac{1}{2}$ oz.

11. IF THE “FOG” IS GENERAL it is caused by extraneous light having affected the plate, either through leakage in camera or slide, or whilst changing or developing, or by having the sun or other bright light *facing* the lens while the picture is being taken. On no account should the direct rays of the sun be allowed to strike the lens.

N.B.—When changing or developing very sensitive plates, care must be taken to expose them as little as possible to the ruby lamp. Even red light will cause fog, if the plate be exposed to it for too long a period, and it is advisable to use yellow in addition to the red fabric usually fitted to the lamp.

INTENSIFYING AND REDUCING.

INTENSIFYING.

IT may sometimes occur that the negative is too thin for printing, *i.e.*, when the plate is held up to the light the image is exceedingly faint.

This may arise from various causes : too little or too much exposure will both produce this effect, or an insufficiently developed plate will result in a like want of density. Hence it is necessary to intensify or strengthen the image by making it denser and

more suitable for printing. This can easily be done in the following way :—

Prepare a solution of

Sal Ammoniac	...	...	...	1 OZ.
*Bichloride of Mercury	...	...	...	1 OZ.
Water	...	...	...	10 OZ.

and having well washed the plate, immerse it in a quantity of this mixture. A change will gradually take place in the colour of the film, it slowly bleaching or whitening all over ; directly this is universal (which can be ascertained by looking at the back) it should be subjected to a most vigorous washing. This done, add to 5 oz. of water about half-a-drachm of liquor ammonia, and pour it quickly and evenly over the plate, when the whiteness will gradually disappear, and a brown tinge will take its place. When this is universal the process is finished, excepting, of course, a few minutes' washing. It should be observed that upon the quantity of ammonia put into the water depends the density of the image—the more ammonia the denser the image—but the above quantity is about correct, and should be sufficient. The plate is once more dried prior to varnishing. A negative can be intensified, if necessary, long after it has been fixed and dried.

**N.B.—We may add that Bichloride of Mercury is a most deadly poison.*

REDUCING.

If the negative, on leaving the fixing bath, seems to be too thick, with an appearance of clogging up and loss of detail in the highest lights, a process of

thinning, or reduction, becomes necessary. This is a simple matter. Make a solution of

Hyposulphite of Soda	...	...	1 oz.
Water ...	...	...	20 oz.

and allow a clean crystal of Ferridcyanide of Potassium to dissolve in a sufficient quantity of the above solution to cover the plate, until the liquid is of a bright yellow colour. Immerse the negative in this, and rock the dish until sufficient reduction has taken place. Well wash, as previously directed for the removal of Hyposulphite after fixing. A flat, foggy plate, may often be made to yield a good print by dissolving the fog away, by means of this reducer, and then well washing and intensifying with mercury and ammonia. If only a portion of a negative requires reducing, the solution may be applied with a camel-hair brush, or a small pad of cotton wool.

The Ferridcyanide solution must not be exposed to bright daylight, or it will turn blue and lose its strength. Reduction is best effected by lamplight, or very subdued daylight.

VARNISHING.

THE plate being quite dry, it should receive further protection from the air, and not be printed from until varnished. A great deal depends upon the quality of the varnish used, some samples affording little or no permanent protection to the picture. The Company prepare a special

kind, which they can recommend. It is possible to print without varnishing the negative, but a great risk is run of the delicate film getting scratched, and the negative ruined.

WARMING THE PLATE.

A little practice will enable the beginner to varnish his plate successfully. Take the plate in the right hand, and hold the glass side before the fire until it is quite warm to the hand.

HOW TO POUR THE VARNISH.

Holding the plate between the thumb and finger of the left hand by the bottom corner, and taking the varnish bottle in the right hand, pour upon the centre of the plate (film side) a quantity of the varnish, sufficient to form a pool on the plate of about one-third of its area ; now gently flow it to the top right hand corner and thence round the plate, finally pouring the superfluous varnish back into the bottle, and gently rocking the plate backwards and forwards to prevent the varnish settling in lines or streaks. Again hold it before the fire until the spirit has evaporated from the varnish, and, finally, place the plate upon a shelf to harden for an hour or two. Care should be taken that no dust settles on the plate during varnishing ; it will also be found advisable to dust the plates with a camel-hair brush before applying the varnish.

VARNISHING CELLULOID FILMS.

Special varnishes are made for protecting film negatives. Heat is not required, the negative being

immersed in the solution, and then suspended by one corner to drain and dry. Another variety is applied by means of a brush, as when varnishing woodwork. Full directions are issued with each kind, which are safe to follow.

PRINTING.

WE will suppose the amateur to have successfully taken, developed, dried (and if necessary, intensified), and varnished the negative.

APPEARANCE OF A NEGATIVE.

The worker will notice that those parts of the picture which reflected most light (as, for instance, a white-washed wall) are densest or most opaque in the negative, while those which were in deep shadow, and consequently darkest (such as the shadow underneath a tree), are most transparent. This must necessarily be reversed to be true to nature; that is, white must be white, and black black, while the intermediate shades or half-tones are in due proportion. This effect we obtain by printing. The following are the

MATERIALS REQUIRED.

A few Porcelain Dishes.

A Printing Frame.

Sensitized Paper.

Chloride of Gold.

Acetate of Soda.

Hyposulphite of Soda.

The printing operations are from first to last rather tedious, and necessarily occupy some time; and, although, for the sake of clearness, we shall, in the following directions, presume that only one or two pictures are being treated, in practice, no one would think of undertaking all the trouble entailed, unless two or three dozen were required. Indeed, from the nature of the work, as will be presently seen, the larger number are as easily done as the smaller, and with no greater expenditure of chemicals. The operations required are four in number, and these we shall treat in detail, namely:—

1. Exposure to Light in the Printing Frame.
2. Toning the resulting Print.
3. Fixing the Print.
4. Washing the finished Pictures.

PUTTING NEGATIVE IN FRAME.

Proceed to a room not too brilliantly lighted, and pulling down the blind, take the sheet of sensitized

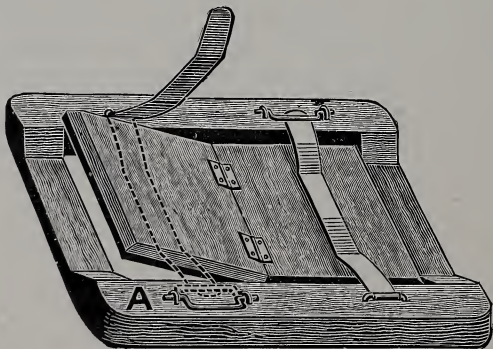


Fig. 13.—Printing Frame.

paper, and cutting it to the required size,* open the printing frame by releasing the brass springs at the back, and taking the hinged backboard out, place the negative in the frame, allowing it to rest evenly on the rebate provided for it, film or varnish side uppermost.

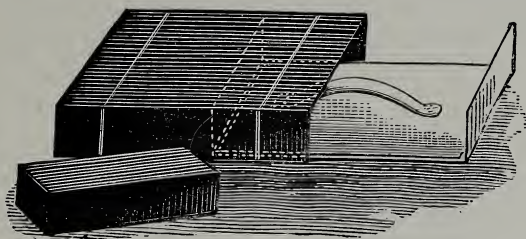


Fig. 14.—Box for storing Sensitive Paper.

Upon opening the box which contains the sensitive paper, it will be noticed that one side of the paper is shiny. Place that side downwards, and in direct contact with the film or varnished side of the negative.

Putting two thicknesses of perfectly dry blotting-paper on top of the sensitized paper to act as padding, replace the backboard and fasten the spring, turn the glass side up to the light to print, not forgetting to clean the face of the negative to insure even printing. It is best *not* to print in direct sunlight, unless the negative is very dense, but in ordinary reflected daylight. It is as well, too, not to attempt to print a batch of pictures unless the weather be fine. In dull weather the work is most tedious and disappointing. The sensitive paper,

* The Stereoscopic Company are now selling this paper cut to all sizes, ready for use, also a combined toning and fixing solution.

having been cut in the first instance to the size of the negative, may be placed in a dark box or drawer ; and, as each picture is printed, it must be removed from the printing frame and put aside in the same place until the whole batch is ready for further treatment.

The printing frame is so made that one side of the hinged back can be turned up during an examination of the print, whilst the other side is held firmly in contact with the negative. The gradual darkening of the image should be allowed to go on until the picture is several shades darker than it is intended to be when finished, for the subsequent processes rob it of a good deal of its force. We have already seen that a dense negative will want a strong light to affect the sensitive paper beneath it. A thin one, on the other hand, must have a weak light, such as that afforded in a room at some feet from a window, or covered with a piece of green glass placed over printing frame. In this way a poor negative can be made, sometimes, to yield a good print.

TONING.

WE now come to an operation that requires a certain amount of care and judgment, but faithful adherence to the directions appended will ensure success, it being assumed that the paper known as "Silver or Albumenized Paper" is used. For other papers and processes see Part II.

THE USE OF THE TONING BATH.

The print when taken from the printing frame is still sensitive to light, and, consequently, if exposed, will darken and become useless. To destroy this sensitiveness, and to alter it from its present brick-red colour to a much more pleasing hue, and also to make it permanent, is the work of the toning and fixing baths. The materials required are as follows:—

1. Chloride of Gold.
2. Acetate of Soda.
3. Four Porcelain Dishes.
4. Hyposulphite of Soda.

COMPOSITION OF "TONING BATHS."

There are various toning baths, most of them possessing advantages of their own, but a good bath, ready for use directly after mixing, can be made with—

Borax (powdered)	...	...	...	1 OZ.
Water (hot)	...	...	...	20 OZ.

Add Gold (in solution), 2 drachms.

Do not use the bath until quite cold.

With the above formula, any variety of tone may be obtained, from dark brown to black; but, as this bath does not possess special keeping qualities, some may prefer the following:—

"DURABLE TONING BATH."

Acetate of Soda	...	...	1 drachm.
Chloride of Gold (in solution)	...	...	2 drachms.
Water	...	...	16 OZ.

This must be mixed twenty-four hours prior to use, and is the better for being mixed three or four days beforehand. It will keep and tone well. The above formulæ are the most popular, both with professionals and amateurs.

BATH FOR BROWN TONES.

Many people prefer pictures of a warm brown tone, and these can be obtained by using a bath composed of—

Bicarbonate of Soda	...	...	20 grains.
Water	...	...	10 oz.
Chloride of Gold (in solution)	...	...	1 drachm.

This bath, though a capital one for yielding warm brown tones, is not capable of being kept any length of time; therefore it is not advisable to make up a great quantity.

The student had better mix one of these baths and label it "Toning Bath," after which take

Hyposulphite of Soda	...	...	3 oz.
Water	...	...	20 oz.

and label it "Fixing Solution for Prints."

SOAKING THE PRINTS.

Previously to toning the prints, they must be washed to relieve them of their free silver. (This salt will make itself evident by causing the washing water to assume a milky appearance, where hard water is used.) For this purpose, take two porcelain dishes, and, filling them with water, immerse the prints into No. 1 dish; leave them for a few minutes to soak, after which transfer them to dish No. 2,

and re-filling No. 1 with fresh water, replace them. They are now ready for the "toning bath," the use of which is to turn them from the objectionable red tinge to a chocolate or dark purple, according to the taste of the artist.

The best way to work is to place before the operator three clean dishes. Into the centre one pour the toning bath; that on the left hand will contain the prints; while that on the right will be filled with clean water. Take the prints separately and place them in the toning bath, moving them about constantly to insure their toning evenly. Do not place more than two or three in at a time.

HOW TO OBTAIN THE CORRECT TONE.

Under the action of the toning bath, the prints will gradually lose their disagreeable brick-red colour, and will assume the ordinary appearance of photographs. It is in this operation that many fail, it being a simple matter to change the colour of the prints, but another thing altogether to secure a rich dark tone. In the after-operation of "fixing" they lose a little of their warmth of colour, and, therefore, as in the printing operation, they must be a little overdone. When the prints have arrived at this stage, take them out and place them in a dish of clean water. Before touching the "fixing bath," carefully decant the toning solution back into the bottle, and when about to use it next time add another drachm of Gold. Theoretically, one drachm of Gold solution should suffice to tone an entire sheet of sensitive paper.

Rich tones can only be obtained with prints from vigorous negatives. With a freshly made toning bath, a good colour may be obtained in from five to ten minutes; with an old solution, an immersion of 20 minutes, or even half-an-hour, may be required. It should be borne in mind, that the temperature has an important effect on the time occupied in toning. In very cold weather, the toning bath may refuse to work until it has been slightly warmed, in this case it should be heated to about 70° Fahr.

OBJECT OF THE FIXING BATH.

Although the prints are not nearly so sensitive as before immersion in the toning bath, still they are liable to discolouration if left exposed to too strong a light; hence, to make them insensitive and also to clear them, we place each separately in the "fixing" or hyposulphite bath, the formula for which we have just quoted.

They should remain in this solution for about ten to fifteen minutes. On no account should they be left together in a mass, or the after-result will be yellow stains where the solution has failed to act.

The student need not be greatly alarmed at the change of tone which takes place directly they are immersed in the fixing bath, as, when dry, they will regain their proper colour.

WASHING THE PRINTS.

Having successfully toned and fixed the prints, nothing now remains but to thoroughly wash them. A great deal has been said and written on the subject

of the fading of photographs; and it has been clearly proved that, under certain circumstances, they *do* fade, and it has been equally clearly shown that, by a proper understanding of the causes, and common attention to the requisite precautions, fading need never occur. The causes of fading are insufficient fixing and washing.

The object of washing the prints is to insure the absence of the slightest trace of the Hyposulphite of Soda, which, although very soluble in water, is most persistent in its adherence to the paper. It is not sufficient simply to immerse them. The water in which the prints are placed must be changed at frequent intervals.

For washing on a large scale, many clever appliances have been devised; but these are needless for amateur use, when, perhaps, only four or five dozen pictures are printed on each separate occasion. When all is said and done, nothing is more effectual than careful hand-washing, and the method of procedure which we recommend is as follows:—Procure two large earthenware pans, such as are used in dairies, and fill each with clean water. Now take the prints one by one from the fixing bath, and place them in pan No. 1; when all are thus transferred, let them remain for two minutes, and pour off all the water, keeping the hand on the prints to prevent them running away also. The paper pictures will now be lying in a mass at the bottom of the pan, which should be raised on edge in a sink, so that all adherent water will run off them. In five minutes' time fill up the vessel once more with fresh water,

allow the prints to soak for five minutes, and transfer one by one to pan No. 2. In, say, fifteen minutes, the same operation may be repeated. After about one dozen such alternate soakings and washings, the prints may be considered free from the fixing salt.

Should this be found troublesome, we would advise the student to use one of the automatic washing trays, which are not only inexpensive, but very efficacious. It is quite self-acting, and when the supply of water has been adjusted, it will continue to discharge itself automatically, until the water supply is discontinued. A very much smaller quantity of water is required for the automatic tray (shown in fig. 15) than by other and older-fashioned methods.



Fig. 15.—Automatic Tray.

PRINTING ON FERRO-PRUSSIATE OR "BLUE" PAPER.

THIS is the simplest of all photographic processes. The sensitive paper is placed in the printing frame in the ordinary way, rather a strong negative giving the best results. The printing is allowed to proceed until the deposit in the deepest shadows has turned from a blue to a sort of

mealy-grey tint. The exposed print is then washed in clean water, until the paper becomes perfectly white in the high lights, when the process is complete. Care should be taken that the washing water is free from any trace of alkali, as this will speedily destroy the image, nor should the washing be prolonged after the whites are pure. The sensitive paper should, as far as possible, be kept from damp.

PRINTING ON GELATINO-CHLORIDE PAPER.

WITHIN the last year or two, the supremacy of albumenized paper has been challenged by the advent of a number of printing-out emulsion papers, of which Paget Prize, Ilford, and Solio, are, perhaps, the most popular. The results obtained by their use are, in every respect, equal to those on the older material, and, in the case of thin flat negatives, in most cases, vastly superior. The fact that a *combined* toning and fixing bath may be used, and that, in this case, the preliminary washing of the prints may be dispensed with, greatly simplifies and shortens the process of printing, while the ease with which the prints may be finished, with either a highly glazed or a dull surface, is a further argument in favour of the new paper.

The actual printing is, of course, carried out in the same way as directed on page 28, when using albumenized paper. Care must, of course, be taken to print a little darker than the finished picture is required to be. After printing, the prints must be

kept from the light, and, as far as possible, from the air, until they are toned. The following solution, which is that recommended for use with the Paget paper, may be taken as a typical one, and suitable for use with any of the Chloride papers now on the market.

COMBINED TONING AND FIXING BATH.

No. 1 Stock.

Hyposulphite of Soda	...	...	20 oz.
Alum (potash alum only)	...	...	5 „
Sodium Sulphate (not Sulphite)	...	...	14 „
Water to	...	...	1 gallon.

Dissolve the Hypo. and Alum each in about one quart of hot water, mix, and then add Sodium Sulphate already dissolved, making up to one gallon with remainder of water. This mixture should then be left for some hours for the precipitate to settle, when the clear solution may be poured off or filtered. and is then ready for use. It will keep indefinitely.

No. 2 Stock.

Gold Chloride	...	...	15 grains.
Acetate of Lead	...	...	64 „
Water (distilled)	...	...	8 oz.

Dissolve the Acetate of Lead in the water and add the Gold. A heavy precipitate forms in this solution, which should be shaken up when any is to be poured out; it redissolves when added to No. 1 stock solution. For use: Mix 8 oz. of No. 1 with 1 oz. of No. 2. When this bath is used the prints should *not* be washed *before* toning.

For the convenience of amateurs, who cannot spare the time necessary for the preparation of the above bath, the Stereoscopic Company send out the two solutions ready for mixing together in the proper proportions.

Travellers will be glad to learn that the ingredients for a combined toning and fixing bath may be obtained in the form of cartridges. These only require dissolving in water to be ready for use.

The print should be immersed (without previous washing) in the Toning Solution, and will, at first, turn a yellowish brown colour, changing afterwards to a rich brown, and, finally, to a purplish black. The toning may be discontinued at any point, after a decided brown tone is reached. A final washing in changes of water of from half-an-hour to one hour's duration finishes the prints. It is to be understood that the toning and fixing may be carried on in weak daylight, or by gas, lamp, or candle light. The final washing may be done in the open air, if necessary, as the prints are then no longer sensitive to light of any kind. If a print is to be kept more than a few hours between printing and toning, it should be protected from the air as much as possible, care must, however, be taken not to place them between the leaves of a printed book, as impressions of the letters are often to be found upon prints so treated.

The toning bath will keep for a considerable time after preparation, and may be used repeatedly, as long as it will give the desired colour. If the greatest possible permanence of the print be deemed necessary, it is advisable to use the combined bath once only.

But a comparatively small quantity need be mixed at one time, and this can be thrown away after use.

The simplicity of the foregoing method has commended itself to most amateurs, the most pleasing tones being obtained with a greater degree of certainty, than when the toning and fixing are performed separately. Experts are divided in their opinion as to the permanency of prints finished in a combined bath, and, when the most permanent image, capable of being produced in a silver bath is required, the following solution is strongly recommended :—

SEPARATE TONING BATH.

Sulphocyanide of Ammonia	...	...	30 grains.
Gold Chloride	...	...	2½ „
Water	...	...	16 oz.

Before immersion in this toning bath, the prints should be *very thoroughly washed*, for at least fifteen minutes in running water. This is necessary to insure even toning.

In hot weather, if necessary, the print may be soaked in Alum (Alum 4 oz., water 20 oz.,) for five minutes before toning in this bath. Another thorough washing is necessary between the alum and toning baths.

Wash well and fix in :—

Hyposulphite of Soda	...	...	3 oz.
Water...	...	...	1 pint

When using the separate toning bath, the colour of the prints should be judged by transmitted light, and not by the surface ; a print which appears to be

sufficiently toned by reflected light, will lose nearly all the purple colour in the Hypo. bath. After fixing, wash the prints in repeated changes of water for about one hour ; prolonged soaking, as recommended for albumen prints, not only softens and injures the surface of the gelatine, but has a tendency to turn the high lights of the picture yellow.

The washed prints may either be mounted at once, while still wet, or they may be hung up by one corner until dry, and then trimmed and mounted in the usual way. If a highly glazed surface is desired, they should be squeegeed down while still wet upon a celluloid, ebonite, or enamelled iron plaque, and, as soon as surface dry, backed with the waterproof paper sold for the purpose by the Stereoscopic Company. When perfectly dry, the prints will leave the temporary support of their own accord, and will be found to have a polish equal to that of the surface which they have just left. A dull surface, like plain paper, may be obtained by squeegeeing the print down upon matt celluloid or ground glass, previously polished with French chalk. It should, however, be noted that the surface, either matt or polished, obtained by squeegeeing, will be destroyed if the prints are again wetted.

TRIMMING THE PRINTS.

THIS is such a simple matter that it scarcely needs much explanation. It is best done before toning, but can be left until just before mounting if preferred.

IMPLEMENTS WANTED.

1. Glass Cutting-shape, the size of print.
2. A sharp knife or Print Trimmer.
3. A piece of Plate Glass upon which to trim the prints.

Take the print and lay it face uppermost upon the glass plate, and above it place the cutting-shape, adjusting it so that the rough edges or parts not wanted are not covered by the glass. With the left hand upon the top of the cutting-shape to prevent it moving, take the knife in the right hand, and run it round the edge of the glass cutting-shape, putting sufficient pressure upon it to cut off the parts not wanted. This can be done in diffused daylight or gaslight if the trimming precedes the toning operations. Damp prints can be trimmed, if one of the Company's new revolving print trimmers be used.

DRYING, MOUNTING AND FINISHING.*DRYING.*

TO dry the prints, take two sheets of white blotting paper (best quality) and, laying the prints down upon one sheet, cover them with the other, and leave them until dry. The prints treated thus will not cockle in the trying manner that spontaneously-dried prints will do. But probably most of our readers will desire to mount copies from their negatives, so that they shall be suitable

for framing, or for presentation to their friends. This is a simple matter, if carefully attended to.

MOUNTING.

In the first place, do not dry the prints, but take a sheet of plate glass and lay the prints face downwards upon it, placing them in rows and layers one upon another; when all are on the glass, take a clean towel and gently press all the moisture out of them; they will then lie flat and even, and are ready for mounting.

The best mountant is starch, made rather thicker than that used by the laundress. It possesses the advantages of great cleanliness and easy application to the back of the photograph. Apply the starch evenly all over the back of the print, and, placing the cardboard in front of you, lay the photograph on the top in its true position; now put over it a sheet of clean paper, and gently rub the hand over the surface of the paper; when this is done it will be noticed that the mount and print are in perfect contact. They may now be allowed to dry spontaneously. Should the prints become dry before being mounted, a more convenient medium than starch will be found in the following:—Soak half-an-ounce of hard gelatine in 5 oz. of water until it is quite soft. Place the vessel in hot water until the softened gelatine becomes perfectly liquid. Now stir in 2 oz. of Methylated Spirit. This mountant should be kept corked in a wide-mouthed bottle. When required for use, the bottle must be placed in hot water until the gelatine melts. A stiff brush is the best thing to use in applying it to the prints to be mounted.

FINISHING THE PRINT.

Many amateurs wonder how it is that their photographs do not possess that high finish which is seen upon the prints which come from a professional photographer's studio. This high finish is due to the use of a burnisher (see sketch), which produces a highly polished surface by means of a heated steel bar. As these machines are now made at a moderate price we should advise the amateur to invest in one of them, if he desires to put the necessary finishing touches to his work.

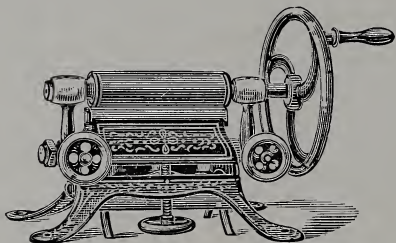


Fig. 16.—Burnishing Machine.

There is, however, another kind of small press which is of great service to amateurs who wish to give their portraits as professional an appearance as possible. This is the cameo press here illustrated. It consists of a strong iron frame furnished with a powerful screw, by which great pressure can be exerted upon a loose iron cover placed below it. This cover has underneath it a bed of thick india-rubber, upon which the mounted print is placed. Above this comes a thick plate of zinc with an oval orifice in it. This is carefully centred on the portrait, the iron cover is placed above it, and the screw is

brought to bear upon the whole. When the picture is, after a few moments, released from the press, its centre is raised in an oval dome, giving it a very handsome appearance. The effect can be improved by masking the portrait immediately after printing with an oval mask corresponding in size with the press oval. While thus protected, the picture can be

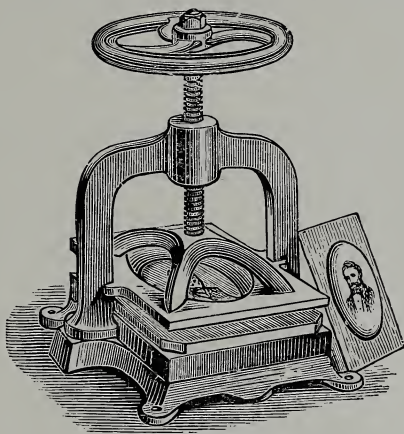


Fig. 17.—Cameo Press.

once more exposed in the printing frame, when all the parts outside the oval can be printed as many shades darker as may be required. This treatment is adapted only to portraits which have been vignetted. A vignetting glass for these portraits can be purchased at a very trifling expense.

ENAMELLING PRINTS.

Prints upon any of the gelatino-chloride papers, such as P.O.P. or Solio, as well as bromide or nikko papers, may be finished with a highly glazed surface,

by drying them in contact with a slab of glass or enamelled iron. This should be carefully cleaned, and, in the case of glass, polished with a little French chalk. The wet prints are laid face downwards, and pressed into contact with a rubber roller or squeegee. When dry, they will leave the slab spontaneously, and will be found to be beautifully enamelled. The gloss will, however, disappear if the prints are wetted, as they necessarily are, for mounting. To avoid this, a piece of stout paper

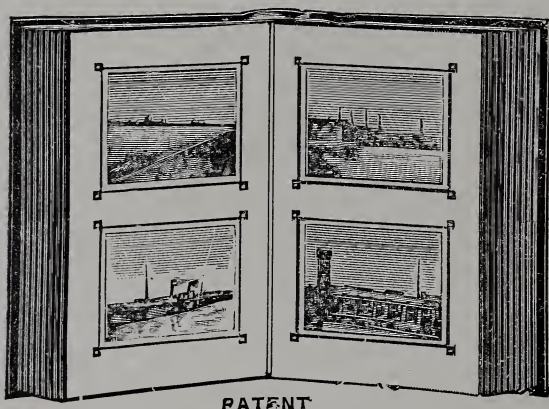


Fig. 18.—“Slip Mount” Album.

should be pasted upon the back of each print after squeegeeing down; this will prevent the mountant from penetrating and injuring the surface. A still better way of dealing with enamelled prints is to use the “slip” mounts and albums, which may be obtained of the Stereoscopic Company. When using these, the print is slipped into position just as a cabinet portrait is placed in an ordinary album.

They possess the great advantage of allowing any print to be withdrawn at will and another substituted for it.

For the guidance of the beginner we herewith append a—

TABLE OF PROCEDURE.

- | | |
|---|-----------------|
| A. Focus the Picture. | L. Wash well. |
| B. Insert the plate in slide. | M. Dry. |
| C. Expose by removing cap. | N. Varnish. |
| D. Develop according to instruction. | O. Print. |
| E. Wash plate. | P. Trim. |
| F. Immerse plate in Alum solution. | Q. Soak Prints. |
| G. Wash well. | R. Tone do. |
| H. Immerse plate in Hyposulphite of Soda Bath. | S. Wash do. |
| I. Wash well. | T. Fix do. |
| J. Dry. | U. Wash well. |
| K. Intensify, or if either proceeding is necessary, reduce. | V. Mount. |
| | W. Dry. |
| | X. Finish. |

N.B.—In all cases the film side of negative must be uppermost, except when inserted in the dark slides.

SIZES OF PHOTOGRAPHIC GLASS.

									INCHES.
$\frac{1}{4}$ plate ...	...	...	...	...	...	...	...	...	$4\frac{1}{4}$ by $3\frac{1}{4}$
...	...	...	...	...	...	...	...	...	5 " 4
$\frac{1}{2}$ plate ...	...	...	...	...	...	...	...	...	$6\frac{1}{2}$ " $4\frac{3}{4}$
...	...	...	...	...	...	...	...	...	$7\frac{1}{2}$ " 5
$\frac{1}{4}$ or whole plate	...	...	...	...	...	...	...	...	$8\frac{1}{2}$ " $6\frac{1}{2}$
Stereoscopic ...	...	...	...	...	...	...	...	...	$6\frac{3}{4}$ " $3\frac{1}{4}$

Beyond $\frac{1}{4}$ -plate the sizes are denoted by the dimensions only, as 10 by 8, 12 by 10, &c.

APOTHECARIES' WEIGHT.

20 Grains	=	1 Scruple	=	20 Grains.
3 Scruples	=	1 Drachm	=	60 "
8 Drachms	=	1 Ounce	=	480 "
12 Ounces	=	1 Pound	=	5760 "

Apothecaries compound their medicines by this weight, but buy and sell their drugs by avoirdupois.

APOTHECARIES' FLUID MEASURE

	MARKED.			
60 Minims m	=	Fluid Drachm	f	3
8 Drachms	=	1 Ounce	...	f $\frac{3}{4}$
20 Ounces	=	1 Pint	...	f O
2 Pints	=	1 Quart	...	qt.
4 Quarts	=	1 Gallon	...	gall.

AVOIRDUPOIS WEIGHT.

1 Pound	=	16 Ounces	=	7000 Grains.
1 Ounce	=			$437\frac{1}{2}$ "
1 Drachm	=			$27\frac{1}{8}$ "

In fluid measure an ounce contains 480 minims, both as bought and used.

A Pint contains 20 fluid ounces, which, of distilled water at 60° Fahr., is $1\frac{1}{4}$ lb.

*FRENCH WEIGHTS AND MEASURES, AND THEIR
ENGLISH EQUIVALENTS.*

FRENCH FLUID MEASURES.

1 cubic centimètre	=	17 minims.		
2 cubic centimètres	=	34	"	
3 "	"	=	51	"
4 "	"	=	1 drachm	8 minims.
5 "	"	=	1	25 "
6 "	"	=	1	42 "
7 "	"	=	1	59 "
8 "	"	=	2 drachms	16 "
9 "	"	=	2	33 "
10 "	"	=	2	50 "
20 "	"	=	5	0 "
30 "	"	=	1 ounce	0 drachm 30 minims.
40 "	"	=	1	3 drachms 20 "
50 "	"	=	1	6 " 10 "
60 "	"	=	2 ounces	1 " 0 "
70 "	"	=	2	3 " 50 "
80 "	"	=	2	6 " 40 "
90 "	"	=	3	1 " 30 "
100 "	"	=	3	4 " 20 "

FRENCH WEIGHTS.

1 gramme	=	15 $\frac{2}{5}$ grains.		
2 grammes	=	30 $\frac{4}{5}$	"	
3 "	=	46 $\frac{1}{5}$	"	
4 "	=	61 $\frac{3}{5}$	"	..... or 1 drachm 1 $\frac{3}{5}$ grain.
5 "	=	77	"	..... " 1 " 17 grains.
6 "	=	92 $\frac{2}{5}$	"	..... " 1 " 32 $\frac{2}{5}$ "
7 "	=	107 $\frac{4}{5}$	"	..... " 1 " 47 $\frac{4}{5}$ "
8 "	=	123 $\frac{1}{5}$	"	..... " 2 drachms 3 $\frac{1}{5}$ "
9 "	=	138 $\frac{3}{5}$	"	..... " 2 " 18 $\frac{3}{5}$ "
10 "	=	154	"	..... " 2 " 34 "
11 "	=	169 $\frac{2}{5}$	"	..... " 2 " 49 $\frac{2}{5}$ "
12 "	=	184 $\frac{4}{5}$	"	..... " 3 " 4 $\frac{4}{5}$ "
13 "	=	200 $\frac{1}{5}$	"	..... " 3 " 20 $\frac{1}{5}$ "
14 "	=	215 $\frac{3}{5}$	"	..... " 3 " 35 $\frac{3}{5}$ "
15 "	=	231	"	..... " 3 " 51 "
16 "	=	246 $\frac{2}{5}$	"	..... " 4 " 6 $\frac{2}{5}$ "
17 "	=	261 $\frac{4}{5}$	"	..... " 4 " 21 $\frac{4}{5}$ "
18 "	=	277 $\frac{1}{5}$	"	..... " 4 " 37 $\frac{1}{5}$ "
19 "	=	292 $\frac{3}{5}$	"	..... " 4 " 52 $\frac{3}{5}$ "
20 "	=	308	"	..... " 5 " 8 "
30 "	=	462	"	..... " 7 " 42 "
40 "	=	616	"	..... " 10 " 16 "
50 "	=	770	"	..... " 12 " 50 "
60 "	=	924	"	..... " 15 " 24 "
70 "	=	1078	"	..... " 17 " 58 "
80 "	=	1232	"	..... " 20 " 32 "
90 "	=	1386	"	..... " 23 " 6 "
100 "	=	1540	"	..... " 25 " 40 "

PART II.

FOR ADVANCED STUDENTS.

IT is very desirable that the reader should master the first part of this manual before he attempts to go farther in the work which he has taken up. Indeed, he would to some extent waste his time by perusing the chapters which follow, unless he has so far profited by our former directions as to be able to take a passable picture. The heading of this chapter will tell him that from this time forward we no longer regard him as a beginner, but as one who is familiar enough with the common byways of photography, and is now longing for "fresh fields and pastures new." We will commence the second section of this book with a few remarks concerning

PHOTOGRAPHIC LENSES.

The beginner in photography will perhaps imagine that he has only to purchase a camera and lens, and that with the one lens he will be able to take landscapes, portraits, and every other type of picture which he may desire. This is only true in a limited

sense. A good modern landscape lens will, with the rapid plates now available, take a presentable portrait; but a portrait lens, made for the purpose, will yield a far better one. A portrait lens is, however, useless for the more general work required by the amateur photographer. A few words, pointing out the difference between the various lenses used, will save the purchaser some little trouble.

The simplest form of all is known as the *single* lens, which is supplied with the cheapest form of apparatus. It really consists of two lenses cemented together, forming an achromatic combination; that is to say, it does not give those fringes of colour which are seen in a lens consisting of one piece of glass only. The single lens is most valuable for all landscape work; and although, as we have said, it is supplied with the cheapest apparatus, it must not be despised for that reason. It has many merits, for it gives beautiful definition, and equal illumination of the entire field; besides which, it is by no means slow: but, it has the disadvantage of bending straight lines. This is immaterial in a landscape pure and simple; but it is a serious defect, and one that cannot be tolerated where buildings are concerned. This bending of straight lines is known as "distortion," and is a defect which never occurs in the form of lens known as the Rapid Rectilinear, described further on.

A new form of single landscape lens recently introduced by the Company has many good points. It has the merit of working as quickly as a rapid rectilinear when required, while being of long focus

in relation to the size of picture it is intended to cover, distortion is reduced to a minimum, and distant views are represented in a more truthful and pleasing manner than with the ordinary type. The larger sizes are excellently suited for portraiture, giving a softness of image not found in any other form. The conical mount of this lens is very neat in appearance, and reduces the weight of the instrument in an appreciable degree.

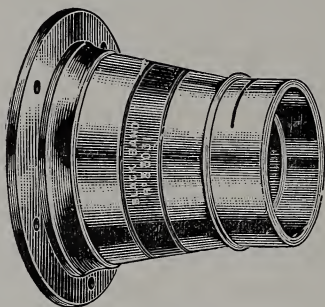


Fig. 19.—The “Black Band” Rapid Landscape Lens

The Rapid Rectilinear lens, which is supplied with all cameras, except the very cheapest, gives, as its name implies, straight lines. It is, moreover, a very rapid one, and is therefore suitable for use with the various mechanical shutters now sold for the purpose of taking instantaneous pictures of moving objects, &c. The rectilinear consists of two lenses, each like the single one already described, placed a short distance apart, with their concave surfaces facing one another. If the camera in use will open out far enough, one of the lenses of the rectilinear may be

used by itself, as a single lens. This is often advantageous when the image on the ground-glass is disappointingly small, and circumstances forbid a nearer approach to the object, as in the case of a ship at sea, or a distant range of mountains. The single lens will be double the focus of the combination, and will therefore give a far larger image.

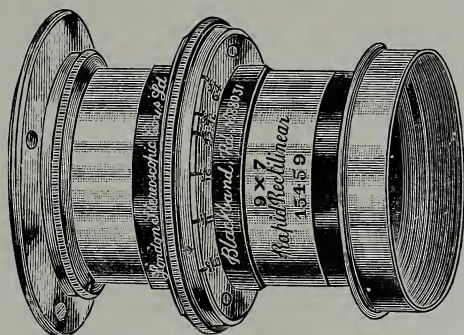


Fig. 20.—The “Black Band” Rapid Rectilinear Lens.

It occasionally happens that the photographer is so placed that he cannot get far enough away from his subject to reduce its image to a sufficiently small compass on the ground-glass. Let us take, as a common instance, the case of a church shut in by a churchyard of narrow dimensions, and surrounded, outside that churchyard, by buildings or trees. It is obvious that, in such a case, the camera must be placed within a very short distance of the church. If we use a long focus lens—say one of the glasses of our rectilinear, as recommended in the case of a far-off object—we should probably see on the ground-glass of the camera just so much of the

church as its door, the image of which would pretty well cover the focussing screen. If we use the rectilinear lens in its complete form, without moving the camera from its former position, the image of the door will be reduced to half its size, and we shall see more of the building on the screen. But still the image is only part of the church, and we want to obtain a general view of the edifice. The only remedy is to employ another lens, of the wide angle, or Portable Symmetrical type (see fig. 21). When

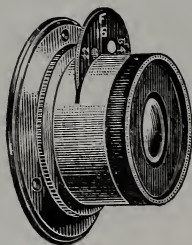


Fig. 21.—The “Black Band” Portable Symmetrical Lens.

this is screwed into position (and it may and should be fitted so as to screw into the same flange as the other lens), the image will be so much reduced in size that the whole of it is included within the limits of the ground-glass screen. These remarks will show the advisability of carrying at least two lenses.

The latest form of lens, and one which cannot fail to commend itself to all who require a very rapid instrument, which is at the same time free from the defects of the portrait lens, is that known as the Euryscope. This, when used with its full aperture, is twice as quick as the rapid rectilinear, thus

rendering it particularly suitable for indoor portraiture, or pictures of animals, detective work, &c., in diffused light out of doors. Moreover, when stopped down to a corresponding aperture, it will be found to give equally good definition and penetration as the rapid rectilinear.

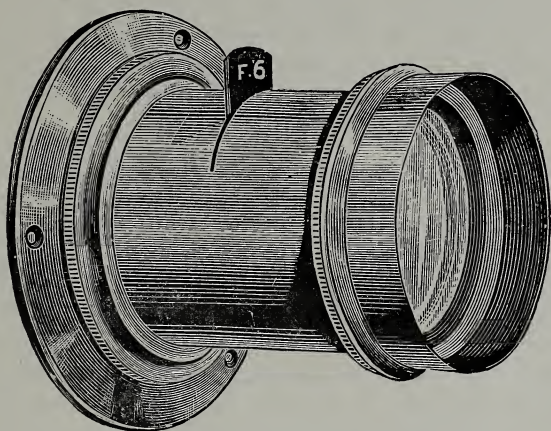


Fig. 22.—The "Black Band" Euryscope Lens.

TELE-PHOTO LENS.

The most important novelty which has appeared in photographic optics, during recent years, is the Tele-photo Lens. It has been produced in various forms, some of them being bulky and nearly all expensive. The Stereoscopic Company have, however, succeeded in adapting the system to their well known "Black Band" Lenses, at a very moderate cost, and the possessor of such an instrument will

find himself in a position to achieve results which have hitherto been deemed beyond the limits of possibility. By its aid birds may be photographed at 100 yards, to show every detail of their plumage, inaccessible architectural details taken on a large scale at a considerable distance, and the details of far-away mountains clearly shown, when an ordinary lens, even of long focus, would only give a grey streak across the plate. The Tele-photo Lens consists of an extra rapid Rectilinear Lens mounted at one end of a tube, at the other end of which is fixed a combination of lenses for amplifying the projected image. The length of this tube can be varied by means of a rack and pinion adjustment, according to the amount of amplification desired, an engraved scale showing at one glance the number of times that the image given by the front lens is magnified, and also the extension of the camera bellows, necessary to bring the picture into focus. The front lens is readily detachable from the tube carrying the amplifier, and can be screwed into the flange on the camera in the usual way. It is, therefore, unnecessary for the purchaser of a Tele-photo Lens to buy a Rapid Rectilinear as well. In fact, most rapid Rectilinear Lenses in existence can be fitted with the sliding tube and amplifier, although the best results are to be obtained from the lenses specially made for this purpose.

It will be noticed that the lenses here illustrated are all decorated with a prominent "Black Band" round the mount. This has been adopted and registered by The London Stereoscopic Company as

a distinguishing mark or brand, and they are prepared to guarantee the excellence of any lens bearing this registered mark.

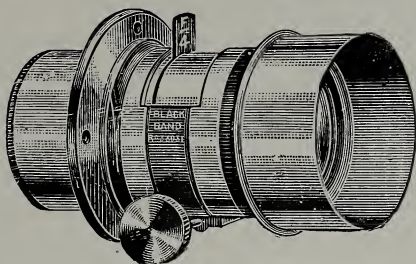


Fig. 23.—The “Black Band” Portrait Lens.

The Portrait Lens is made simply and solely for portraiture, and its leading characteristics are sufficiently pointed out in the chapter devoted to portraiture.

DIAPHRAGMS OR STOPS.

EVERY lens, except those of the cheapest class, is furnished with a set of diaphragms or stops.

In the wide angle and single landscape lenses they are usually arranged on a revolving plate between the lenses of a doublet, and in front of the lens in the single landscape form, while in the rapid forms of lenses each diaphragm is formed of a separate plate. Hitherto we have supposed that the beginner has confined himself to the use of one of these only, but as more varied and difficult subjects have to be undertaken, the use of larger or smaller apertures

become necessary, and a few hints may now be given on the subject. A simple experiment will more clearly demonstrate the action of diaphragms than the most elaborate description or diagram. Screw the lens into the camera, and placing the apparatus inside an ordinary room, use the largest diaphragm, and focus the image of the window sash sharply. It will now be found that objects nearer the lens, as well as the view outside the window, will be more or less confused and indistinct in their outlines. Now insert a medium sized diaphragm, and not only will the objects at different distances be more clearly defined, but the definition on the edges of the plate will be improved; this will be still more noticeable when the medium-sized stop is replaced by the smallest in the set. This clearly shows that the function of diaphragms is to improve the general definition of the picture and to give sharpness to objects at varying distances from the lens. It will be noted that the diaphragms are marked with numbers F8, F11, F16, and so on; these show the relation of the aperture of the particular diaphragm to the focal length of the lens to which it belongs. Thus if a lens be of eight inches equivalent focus, the diaphragm marked F8 will be one inch across the opening, and all lenses, no matter how long or short may be their focal length, will work with the same rapidity when a diaphragm bearing the same number is inserted. Thus supposing an outfit to contain three lenses—a rapid rectilinear, a wide-angle rectilinear, and a long focus landscape lens, of eight, four, and sixteen inches focal length

respectively, and the stops marked F16 used in each case a precisely similar exposure would be necessary, although the diaphragms would be in the first case $\frac{1}{2}$ inch, in the second $\frac{1}{4}$ inch, and in the last 1 inch in diameter. The sets of diaphragms are usually arranged so that each one requires twice the amount of exposure that the next larger one does. The mathematical rule is that the exposure varies in inverse ratio to the square of the diameter of the stop; *e.g.*, if the F8 stop requires an exposure of half-a-second the F16 will require two seconds, and the F32 eight seconds. A very ingenious form of diaphragm, long known to microscopists, has lately

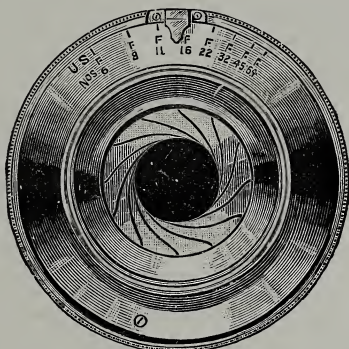


Fig. 24.—The "Iris" Diaphragm.

found favour with photographers. It is known as the "Iris" Diaphragm, from the fact that by rotating a ring placed round the lens mount, the diaphragm, which is inside, opens and closes from the centre in the same manner as the iris of the human eye. A graduated scale on the lens tube shows at a glance the aperture of the diaphragm in use.

We may mention that any existing lens can be fitted with the Stereoscopic Company's new "Iris" diaphragm (fig. 24).

HINTS ON PORTRAITURE.

THE position of a sitter, while it has generally the least attention paid to it by the amateur, is really the most important matter in photographic portraiture; be the photograph ever so clear, sharp, and well-balanced in light and shade, ever so beautiful in tone, or correct as a likeness, the production is valueless unless it present a graceful and characteristic *pose*. Rules without examples can scarcely afford assistance, and little more can be done, in a work like the present, than to draw the operator's attention to the subject, and to recommend him, if he wish to practise this branch of the art, to study works on art and composition, as applied to portraiture. But let us at once point out that, although we must acknowledge the excellence of amateur photographic work generally, portraiture is the one branch of photography in which the amateur does not usually distinguish himself. Nor can this be a subject for surprise. It is rather difficult to obtain a good portrait without a photographic studio fitted with all kinds of appliances—and this very few amateurs possess. Formerly amateurs' portraits were not generally appreciated by good-natured friends, who, after giving the generous one no end

of trouble, would show his *chef-d'œuvre* to their acquaintances with the remark, "He is only an amateur, you know." Now, however, thanks to modern lenses and plates, satisfactory portraits can be taken in the open air, or even in an ordinary room, and the following remarks may be useful to those who wish to experiment in this class of work.

A little trouble and expense in procuring a proper background is repaid by the results; a blanket answers well for a light background, but it is rather too light in some cases; a grey head or light cap will seem to sink in the picture taken with it. Green

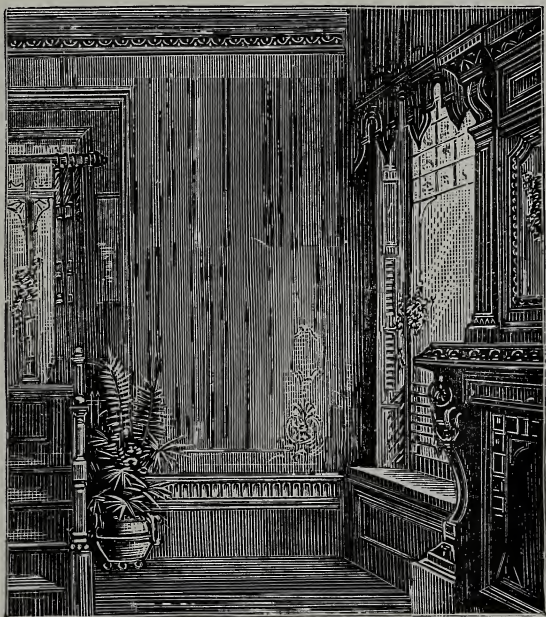


Fig. 25.—Scenic Background.

baize backgrounds give great relief to the figure when it is not darkly draped; but, as a rule, a colour should be chosen which, by contrast, will not impair either the purity of the whites, nor the depth of the shadows in the portrait.

Perhaps the most generally useful background is one of a neutral tint, softly graduated from a light to a darker shade; when in use, the light side should be placed behind the shadow side of the face, thus giving the effect of the light falling on an alcove, and adding greatly to the relief of the figure in the resulting picture. Scenic backgrounds are sometimes useful, particularly when full length pictures are to be undertaken (fig. 25). Only those of the most simple design should, however, be chosen. Obtrusive landscapes and sharply defined interiors must be studiously avoided. In all cases, whether using a painted background, or what may be termed a "natural" one, care should be taken that no straight line, either horizontal or vertical, runs into any important part of the figure. In portraits taken with that favourite amateur background, a French window, one frequently sees the frame running up directly from the sitter's head, while a cross-bar appears to grow out of his ear; but little care is needed to avoid this defect, when it has once been pointed out.

Screens are indispensable to moderate the intensity of the light, and introduce a proper amount of shadow on parts of the figure; for a portrait taken in the open air, a screen—which may be a dark table cover thrown over a clothes-horse—should be placed on one side of the sitter, and nearly at right angles with

the background; very delicate shadows can be produced by its aid. Generally, open air portraits have too much top light, causing heavy shadows in the eyes, and under the nose and chin; in such cases the remedy is found in using a dark screen over the head of the sitter, projecting from three to five feet from the top of the background.

A very convenient substitute for a properly built studio will be found in the Stereoscopic Company's Lawn Studio, of which the accompanying illustration gives a good idea. This is fitted with adjustable

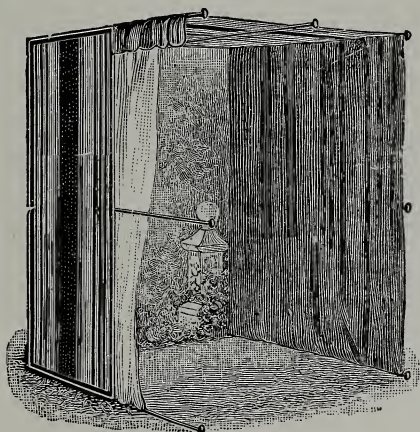


Fig. 26.—Lawn Studio.

screens and curtains, and enables the owner to obtain most of the effects seen in professional portraiture. When out of use, the Lawn Studio may be folded up and put away like an ordinary screen. Another form of outdoor studio is known as the Canopy. The

frame is composed of bamboo, and the whole arrangement may be packed into a box about six feet long by a foot square. It takes a little longer to erect than the Lawn Studio, but is, on the other hand, more spacious. Undoubtedly the best form of studio, short of a brick or wooden erection, is the Company's Portable Tent Studio (see fig. 27), as it

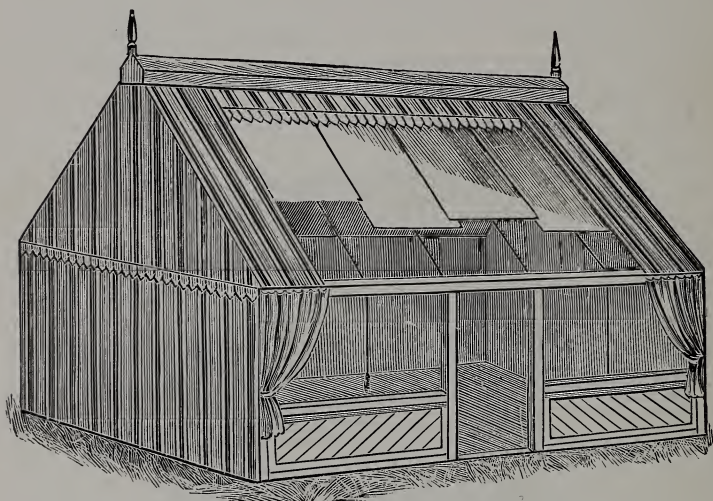


Fig. 27.—Portable Tent Studio.

is in every sense a practical photographic studio, in which every advantage of artistic lighting can be enjoyed. The fullest details of this studio can be had on application.

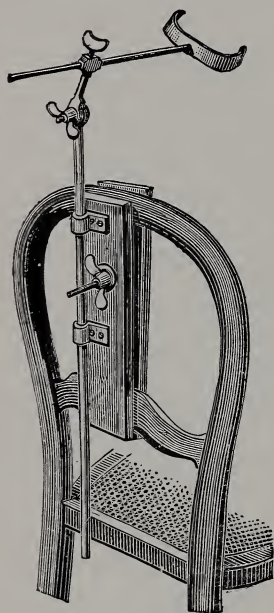
When a portrait has to be taken in an ordinary room, it will be found necessary to fix a white, or light blue screen in a parallel line with the window, and place the sitter and background in the space

between the two, with the light full on the face ; the object of the white screen, which may be a sheet, is to throw back a portion of the light from the window on one side of the sitter's face, which would be too deeply in shadow, without some reflected light.

The focus of a portrait lens is very limited in depth ; that is, it will not produce sharp and well-defined images of objects which are at different distances from the camera—if one be in focus, the other will be out. This want of depth increases as the objects are brought nearer to the lens ; hence the necessity for placing the sitter with care, that the hands and the face may be nearly on the same plane, and that no part of the arrangement may project towards, or recede very greatly from, the camera ; not only will those parts be indistinct, from being out of focus, but they will also appear much distorted.

The colours of the background and dresses of the sitter greatly influence the time of exposure in the camera : a plate which would require thirty seconds exposure if the background were very dark and the sitter clad in black, would, in the same light, be over-exposed in twenty seconds with a light ground, and light-coloured drapery. Now a light colour, in a photographic point of view, is not always what is commonly considered a light colour ; yellow is light, but yellows scarcely have any effect on the most sensitive plate, and the result is dark ; reds are very nearly as dark ; but bright blue, even when deep in tone, produces an effect almost identical with white.

It being understood that yellow and red draperies develop darker, and blues lighter than they really are, and that these three colours are components of all other colours, it is then easy to judge the effect of any compound colour; for instance light green and purple produce medium tints, unless the yellow in the former, and the red in the latter be in excess, in which cases the results will be dark.



Head-rests are highly useful when properly managed; the most simple form of rest can be screwed on the back of a chair, as shown in the annexed cut, and easily adapted to the position of the sitter; it should be fastened without pushing the head forward, or otherwise giving the sitter an awkward and constrained appearance.

The portrait camera should be kept in good condition, dusted out occasionally, and examined as to its being light-tight; the lenses will also require attention, and careful

Fig.28.—Portable Head Rest. polishing with wash-leather.

The camera, when in use, must be carefully screened from sunlight with the focussing cloth; when the dark slide, carrying the prepared plate, is inserted in the camera, the cloth can be thrown over it, and the slide drawn up under the cloth, to

prevent any light finding its way to the plate through the crevice in which the slide moves.

Sunlight falling on the lenses causes fogging on the lower half of the plate ; the face of the sitter may be brought out clearly, but the lower part of the figure will be in a mist. To prevent this disagreeable effect, the sun must be screened from the lenses, either by a dark blind above, or an addition in length to the front of the brass tube ; a card-board or tin tube about three inches long and blackened inside, can be made to fit over the brass, and draw in or out, as far as may be required, to shield the lenses from the glare of light.

GROUPS.

AS the amateur is more often called upon to photograph a group of persons than any other subject, this chapter would not be complete without some hints on the matter. Little can be done in the way of arranging large groups, of, say twenty persons or more, but a small group affords scope for the display of much artistic taste and skill. If possible the various figures should be arranged to convey some definite idea, such as the leave-taking of a guest, a bit of gossip, or an accidental meeting, rather than a bunch of people sitting for a photograph ; an *al fresco* tea-party, resting after a tennis

match, or needlework and reading parties will suggest many graceful and interesting pictures.

The ordinary Rapid Rectilinear lens is eminently suited for this class of work, and should be fitted with a pneumatic shutter, which will enable the exposure to be made without attracting the notice of the sitters. Such shutters will be noticed at length in the chapter on Instantaneous Work.

RETOUCHING.

THE art of Retouching or Modelling a negative is one of those things that can be better understood by a single practical demonstration than by volumes of written instructions. Still, we shall endeavour to make clear to the pupil its leading features. A landscape or architectural negative should never need retouching, unless, through some neglected bubbles in the developing solution, or from some other cause, transparent spots mar its beauty. These can be filled in with India ink, applied with a fine sable brush. Retouching proper is confined to portrait negatives, and it is executed with a hard lead pencil, either before or after varnishing.

Professional photographers use a retouching desk upon which to place the negative while under treatment. It consists of an inclined board with an orifice in the centre, in which the negative is held.

A sloping board above, hinged to the first one, prevents light being reflected *upon* the surface of the negative; whilst a sheet of white paper placed on the table causes plenty of light to be transmitted *through* it. (Fig. 29.)

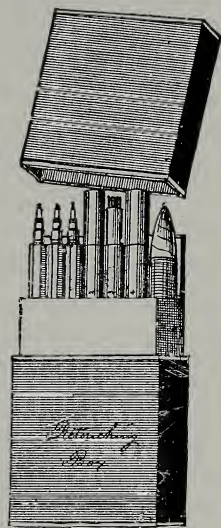
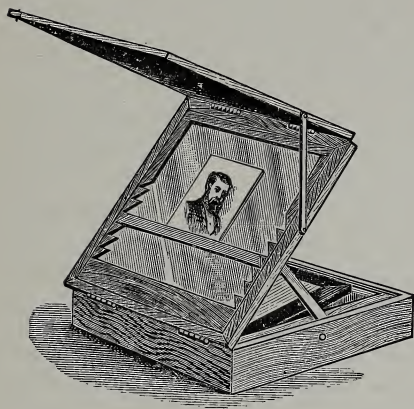


Fig. 29. Retouching Outfit. Fig. 30.

Neither the gelatine surface nor the varnished surface will allow pencil markings, unless it be first gently roughened. This is best done with the aid of a medium sold for the purpose. Apply the medium with the finger to the place where retouching is to be executed (the face and sometimes the hands of a portrait), and rub gently in a circular direction for a few moments. This operation will give the formerly repellant surface a *tooth* like drawing paper,

upon which the pencil will readily leave its mark. The most common facial blemishes which require correction are freckles. These may be really so faint in colour that they pass unnoticed, but the searching eye of the camera will not only find them out, but will depict them as black spots. These, in the negative are, of course, reversed ; that is to say, they are clear markings which require to be filled up. The pencil must be sharpened to a fine point, and must afterwards be kept in the same state by occasional application to a piece of fine glass paper by the side of the retoucher's desk. Commence work at the left hand side of the negative and proceed towards the right. To stop up a freckle, approach it with a fine stroke and increase the pressure as you go over it, and end with a fine stroke once more ; cross the line with another, and another formed in the same way, and the blemish will disappear without the manner of its obliteration being detected. Lines in the forehead may be weakened in the same way ; whilst the high lights on the nose and chin, and even the little spark of light in the eyes, can be most effectively strengthened. Aim at putting as little as possible on the negative, but take care that that little shall be effective. Touches of light on the hair, and sometimes on the dress, particularly in the case of linen or lace, are often highly useful. But the beginner will do well to test the effect of his work from time to time, by printing rough proofs of the negative under treatment. He will then see for himself where his faults lie, and be able to correct them.

Many little blemishes, which, in spite of every care, will creep into a finished photograph, can be remedied by the operation of "spotting out" after the picture is mounted. This consists in covering any spots with a touch of water-colour, made up of tints which will agree with the general tone of the print.

THE DARK ROOM AND ITS FITTINGS.

ONE of the greatest aids to the successful practise of amateur photography is a well fitted operating chamber, or, as it is usually called, a "dark room." If a room has to be temporarily darkened and chemicals, dishes, &c., arranged in it and then cleared away each time that a few plates have to be developed, much valuable time is wasted, and the pleasure of working considerably reduced. It cannot be denied that many successful amateurs do good work under such circumstances, but it is equally certain that a greater amount of work could be done, if only a tiny place could be exclusively devoted to photography, so that even stray half-hours could be utilized for development, bromide printing, or transparency work. Of course, the larger the apartment which can be devoted to the purpose the better, both for the health and comfort of the photographer as well as for the increased scope which will be given for the introduction of new departures in enlarging, printing, and the like, for some of which a considerable amount of space is necessary. We will, however, assume that

a small linen closet or box room only is available, and show, with the help of the accompanying diagram (fig. 32), how a very good dark room may be constructed in a space only $3\frac{1}{2}$ feet by 4 feet in area and about 8 feet in height.

In looking at the drawing, we are supposed to have opened the door which, in this case, is placed opposite the window, although, if more convenient, it may be situated on either side. The coloured window is indicated by the letters A B and C, which represent sliding frames covered with orange and red glass or fabric, and clear glass respectively, thus allowing either a combination of red and yellow to be used for rapid plates, red alone for slow plates or bromide paper; yellow for cutting sensitive paper, filling printing frames, or toning, white light for trimming, mounting, mixing solutions, and last, but not least, for an occasional clean out of the sink, dishes, &c. Immediately above this window are two shutters, D D, which, on being opened, admit white light, in a position which is convenient for the examination of negatives. They also serve to admit air to thoroughly purify the chamber when not in use. Above this, in the roof, is a light tight ventilator, V, which is shown in section below

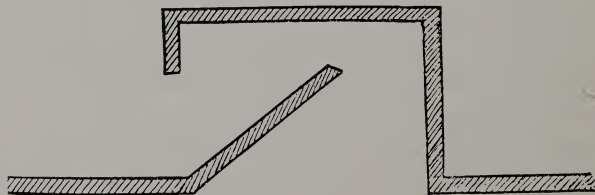


Fig. 31.—Section of Ventilator.

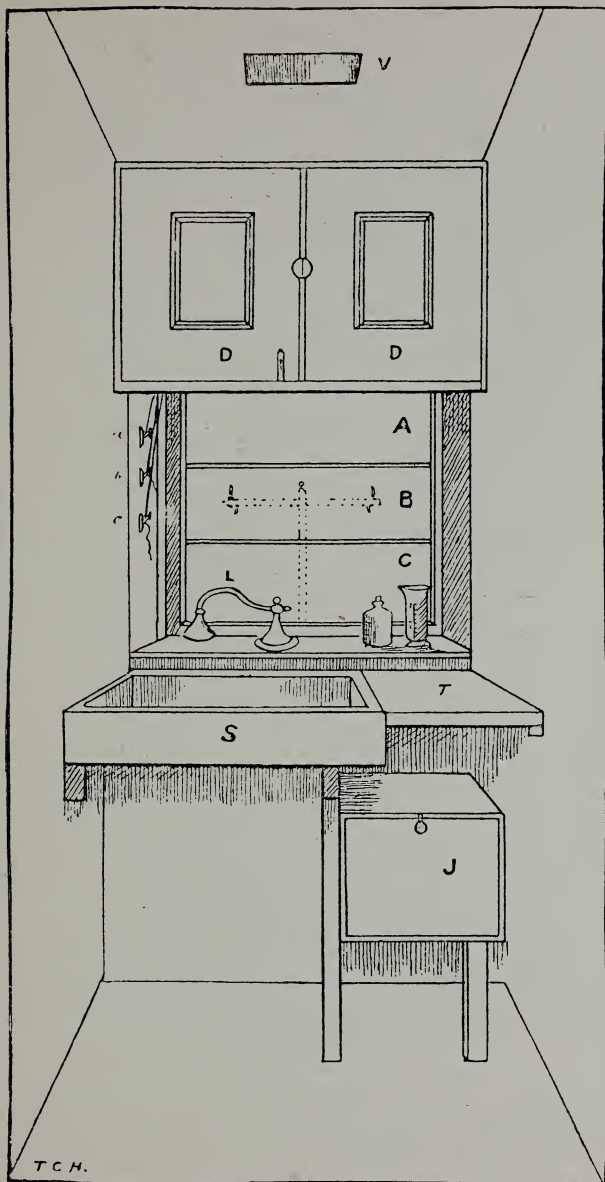


Fig. 32.—The Dark Room.

This is, of course, arranged to allow the egress of impure air, fresh air being at the same time admitted by a row of holes drilled in the bottom of the door, and screened to prevent any entry of white light. This arrangement is clearly shown by Fig. 33.

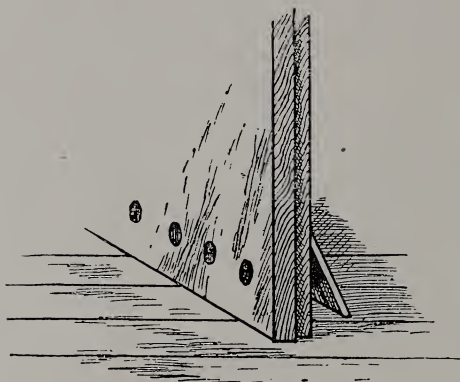


Fig. 33.—Ventilating holes at bottom of door.

The sink, S, may be either of earthenware or of wood lined with lead, the former being preferable on account of the ease with which it may be kept clean. On the other hand, accidental breakages of bottles and measures will be less frequent with a leaden sink. L is a swing tap, provided with a rose, which distributes a fine shower of water over the plate or paper when washing. T is a small table, beneath which is a light-tight cupboard, J, for storing plates, &c. The top of this forms a convenient shelf for the Hypo. dish. It is convenient (although not absolutely necessary) to have a strong draining rack, in which negatives may be dried in safety, fixed just

below the shutters D D. A rack for dishes may also be fixed underneath the sink.

A ready way of fitting up a dark room is to pro-

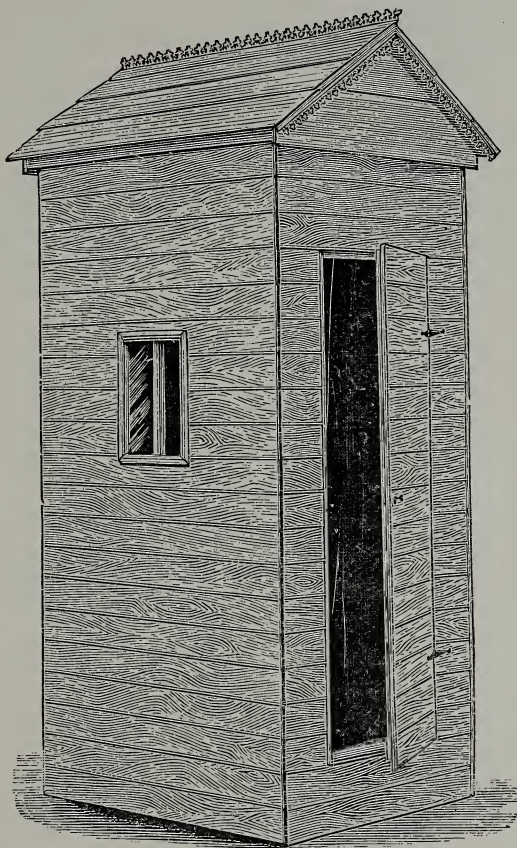


Fig. 34.—Outdoor Dark Room.

cure one of the Stereoscopic Company's developing sinks, as shown on the page 77; it will be seen

from the illustration that nearly all the fittings just described are present in this very useful piece of furniture. If no room indoors can be converted, one of the two outdoor dark rooms here illustrated will be found to answer every purpose. They have, moreover, the merit of being quite moderate in price, less than a five pound note will purchase the smaller; although so solid in appearance, this room can be readily taken to pieces and re-erected without skilled labour, in case of removal being necessary.

DARK ROOM DEVELOPING SINK.

This sink is designed to meet the wants of professional or amateur photographers, and will be found to include every requisite for development. It is constructed in separate parts for convenience of transport. The sink is of vitrified enamelled stoneware, and is fitted with an overflow waste stopper, so that it may be used either full or empty. When the stopper is in, the sink forms an excellent apparatus for washing prints.

The water is supplied through a swing-arm tap, extending to the centre of the sink, and having a rose at the end of the arm, which will be found very advantageous for thorough washing, &c. The tap is so arranged that the flow of water gradually increases in force as the arm is extended. A second tap of the ordinary kind, for filling bottles, &c., has also been added.

The bench surrounding the sink is grooved, so as to drain into it, and is coated with shellac varnish.

The sink is also provided with a loose grid rack, to carry dishes, &c., under the rose tap.

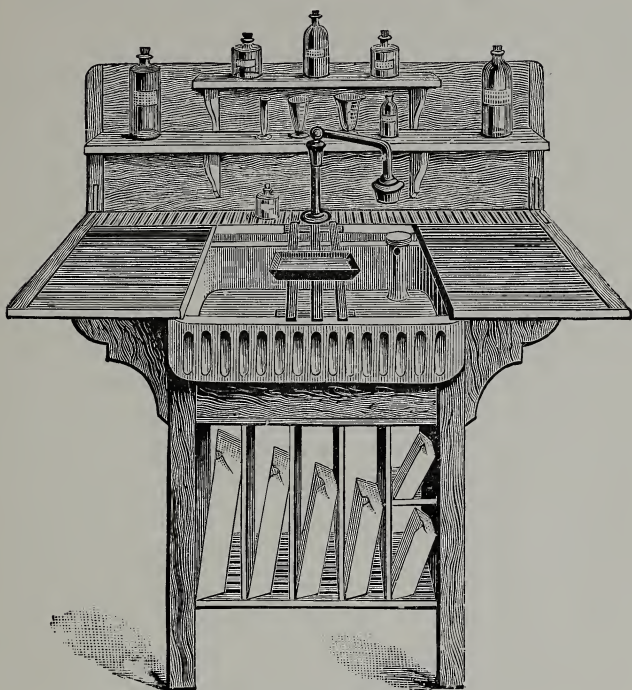


Fig. 35.—Developing Sink.

The table supporting the sink is fitted with a rack to hold the dishes, and at the back shelves are fitted to take the necessary bottles.

The Company make it in the three following sizes :—

No. 1,	with sink,	24 × 17 ;	extreme width	4 ft.
„ 2	„	30 × 19 ;	„ „	5 ft.
„ 3	„	36 × 22 ;	„ „	6 ft.

MAKING MAGIC LANTERN SLIDES.

EACH succeeding year finds the "magic," (or as it is now preferred to call it, the "optical lantern"), growing in favour. The old style of expensive hand-painted slides, beautiful as some of them were, is almost obsolete, and here, as in so many other fields of usefulness and ornament, photography reigns supreme. No matter how good a paper print may be, it lacks the softness and brilliancy of a glass transparency ; detail, which in the paper picture is buried in the shadows, is distinctly visible in a good lantern slide, while at the other end of the scale, the more delicate tints of the extreme distance are retained in all their beauty. Many an amateur, tired of negative making and paper printing, has turned to his plate boxes with renewed zest when the ease with which lantern slides can be produced has been demonstrated to him, and has "fought his battles o'er again" on three-and-a-quarter-inch plates, to the delight of many of his friends, to whom the collection of small paper prints is a bore, but who will gladly view a good lantern exhibition, enlivened by a little gossip as to the circumstances attending the taking of each picture. Lantern slides may be made by either of two methods, known respectively as contact printing and camera copying. The former, being the most simple, shall first be described, although it may be premised that the chemical manipulations in each process are identical. Fortunately for this process daylight is not necessary

nor even desirable, so that winter evenings and dark days are available for transparency work.

Little or no special apparatus is required for the contact process, the following being the full list of requisites :

Small negatives.

Printing frame for same.

Special gelatine plates, $3\frac{1}{4}$ inches square.

The usual developing dishes and chemicals.

A gas jet or paraffin lamp.

The operations are most conveniently conducted in the dark room, using the regulation ruby light, with the exception of the exposure ; for this it is better to keep a lamp or gas jet burning in an adjacent apartment, to be used as directed later on.

The negative to be used is carefully dusted, and placed in the printing frame, in the same manner as for the ordinary paper print ; one of the sensitive plates is now also dusted, and placed film side downwards upon the portion of the negative to be reproduced, taking care not to shift the sensitive plate in so doing ; the frame is now covered with a focussing cloth, and carried into the room where the lamp or gas is burning ; holding the frame about two feet from the flame, exposed for the requisite number of seconds (in case of an ordinary negative not too dense, ten seconds will be enough), immediately replacing the cloth, and returning to the dark room for development. This may be effected by the ordinary ferrous oxalate process. After well washing the transparency is fixed, and finally washed in the same manner as a negative. When hard water is used

for the washing, a slight milky veil usually appears over the whole picture. This may be avoided by washing the developer off with distilled or rain water, or may be removed after fixing by soaking the plate in a 10 per cent. solution of Citrate of Soda.

We can now judge as to the quality of our work. If the picture appears veiled in the high lights, with a lack of density in the shadows, the plate has received too long an exposure, while a hard black and white picture on the other hand, points to the reverse, or under-exposure. A good transparency should contain a perfect scale of tones, from complete opacity to absolute transparency, though these two extremes should be present in the smallest possible proportions.

The very highest lights should not show the faintest veil when laid on a piece of white paper.

Should the alkaline developer be preferred, the following formula will be found to give brilliant results:—

A {	Washing Soda	...	...	1 oz.
	Bromide of Ammonium	...	...	10 grains.
	Water	...	...	1 quart.
B {	Sulphite of Soda	...	...	2 drachms.
	Water	...	...	4 oz.

Add sufficient Citric Acid to B to turn blue litmus-paper slightly red, after which add 32 grains of Pyrogallie Acid. For use, add one drachm of B to seven of A, and give prolonged development, after which fix in Hypo., wash, and treat in every respect as a negative.

The now popular Hydroquinone developer is very suitable for this class of work ; any of the recognised formulæ may be used with success, although most of those prepared for negative work will require dilution with water, and the addition of a few drops of a 10 per cent. solution of Bromide of Potassium.

The ordinary Pyro-Soda developer, as given at the end of this book, will answer well if an addition of 10 minims of a 10 per cent. solution of Bromide of Potassium be made to each ounce of mixed developer.

Amidol is also an admirable developer for lantern transparencies. The tone obtained by its use is a fine black, the resulting pictures showing great detail in the shadows.

After becoming familiar with the foregoing process, the operator will naturally wish to make transparencies from negatives whose dimensions do not allow of contact printing. For this purpose the camera must be called into requisition, the instrument which has been used for obtaining the original negative usually being quite suitable for making the transparent positive. A firm table should be used to arrange the apparatus upon in the manner shown in the accompanying diagram ; in this BB represents

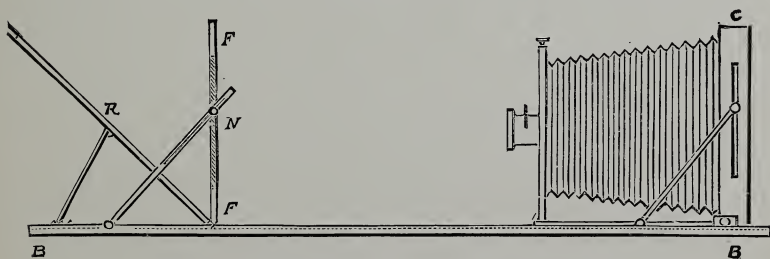


Fig. 36.—Apparatus for taking Transparencies.

a baseboard, on which are screwed two slips of wood, between which the camera can be easily moved from end to end, so as to approach or recede from the frame F F, according to the amount of reduction required. The negative N is placed in the frame F F, and backed up by the reflector R, which may be a *perfectly white* card, or better still, a stout card covered with white blotting paper. A sensitive plate, as used for contact printing, is inserted in the slide, and the image of the negative having been carefully focussed and adjusted on the ground glass, an exposure varying according to the light, size of diaphragm, and density of the negative is given. The development and finishing differ in no way from those necessary for the contact process.

It is advisable to cover the intervening space between C and F with a large focussing cloth, so that no light is admitted to the lens excepting through the negative.

When thoroughly dry, the lantern picture should be covered with a black paper mask, with a square, round, or cushion-shaped opening, according to taste. Above this, a cover glass, the size of the picture, is placed, the whole being bound together at the edges with thin black paper. The best medium for attaching this paper to the glass is—

Gum arabic	...	...	...	...	1 oz.
Loaf sugar	...	...	...	...	$\frac{1}{4}$ oz.

Mixed with sufficient water to form a thick mucilage. This medium is readily mixed if the gum be purchased at a chemist's in a finely-powdered state.

Strips of suitable paper, ready gummed and of the correct size, are supplied by the Company at a nominal cost.

Transparencies for window decoration on plates of any size may be produced in exactly the same way as that described for lantern-slides. Such a mode of decoration is invaluable in town houses, where a noble window too often has a forbidding outlook.

ENLARGING.

THE amateur who has become an adept in producing good negatives, and brilliant prints from those negatives for mounting in his album, will soon begin to regret that his pictures are not larger. He will probably wish for something big enough to frame—"a thing of beauty and a joy for ever"—to which he can point as evidence of his photographic skill. But it is only very few who can undertake the task of producing directly in the camera these large pictures. It means increased expense in every direction. The first cost of the apparatus is perhaps tenfold, after which the large plates required and the increased amount of chemicals consumed constitute a serious item of expenditure. One more objection to large pictures is the cost of transportation. The apparatus can no longer be carried by one pair of hands, nor will any kind of bicycle or tricycle sustain it.

But the owner of small apparatus need not for these reasons despair. A good negative, be it only

of quarter-plate size, can be enlarged : such enlargement often giving a finer result than the original negative. Indeed, many will prefer the enlarged copy, for the reason that the extreme sharpness of the small negative being softened down in the process, the resulting picture is, therefore, more artistic.

The amateur has the choice of more than one method of making an enlargement from a small negative. If he requires but one copy, the easiest plan is to employ an apparatus on the magic lantern principle which is sold for the purpose, treating his little negative like an ordinary slide, and throwing its image upon a board covered with white paper. This is done in the dark room. The image so projected by the lantern is carefully focussed, its size being governed by the distance of the focussing screen from the lantern. When this is satisfactorily accomplished the lens of the lantern is capped, and the board is covered with a sheet of Gelatino-Bromide paper (sold by the Stereoscopic Company for the purpose). Now once more the cap is removed, and the light is left to do its work on the sensitive surface. The time of exposure is dependent upon so many things that it is impossible to give any hard-and-fast rule. With a portrait lens, which is suitable for this class of work, and a mineral oil lantern of good construction, and supposing that the lens is two feet away from the sensitive surface, the exposure will be about one minute. A thin negative will make the time less, and a dense one, or a yellow one, will much increase it. The best

plan is to make several test exposures, by taking a slip of the prepared paper and ruling it into half-a-dozen divisions. The image of the negative is then allowed to fall across the strip, whilst each division is successively uncovered. When the first division has had half-a-minute, uncover the next, wait another half-minute and uncover the third, and so on. This strip is afterwards developed, and it will be quickly seen which section of it has received the correct exposure.

After exposure the paper is placed in a dish and thoroughly wetted with water; this is drained off, and the surface flooded with a sufficient quantity of one of the non-staining developers. Ferrous Oxalate, Hydrokinone, Eikonogen, Metol, or Amidol being all well adapted for this class of work. The Amidol developer is a particularly good one for Bromide prints, and can be conveniently made as follows :—

Sulphite of Soda ...	...	...	1 oz.
Bromide of Potassium ...	...	...	20 grains.
Water ...	...	...	20 ozs.

When required for use, add to each ounce about 3 grains of dry Amidol. This will dissolve immediately, and the developer is ready for use. One valuable property of this developer is its great “staying” power. As an experiment, the writer has developed three dozen half-plate Bromide pictures with six ounces of the above solution, and even then the developer seemed to have lost but little of its original energy.

The image will appear quickly, and should be carefully watched in order to avoid over develop-

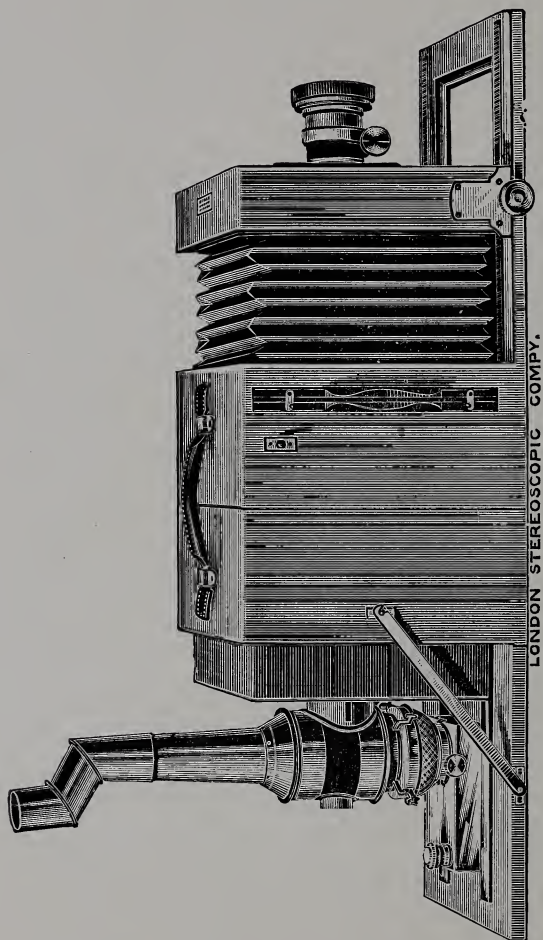


Fig. 37.—The Stereoscopic Company's Black Band Enlarger. Open.

ment. When it is nearly dark enough, drain off

the developer, and allow the action to continue with the help of the solution which has been absorbed by the paper. Then wash well in plain water, after which fix and wash as for a print on albumenized paper, taking care, however, to avoid abrading the tender surface of the softened gelatine.

This is a necessarily brief epitome of the operations required, but full directions accompany each packet of the gelatine paper.

If several copies are required of an enlarged picture, it will be a better plan to produce in the

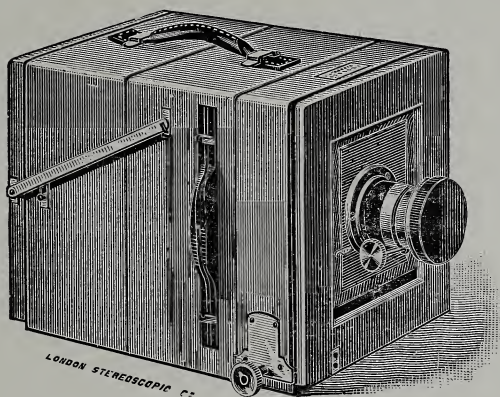


Fig. 38.—Black Band Enlarger. Closed.

first instance a transparency, as detailed in the chapter on Magic Lantern Slides. This can now be made to yield an enlarged negative on the gelatine paper. When dry any little defects can be remedied with a brush and Indian ink. The paper negative can be made transparent by rubbing it over with vaseline, and holding it in front of a

clear fire until it appears quite translucent. Of course the vaseline must be applied to the back or uncoated side of the paper, as it will not penetrate the gelatine. This negative is now treated in all respects as a glass negative, and will yield good silver prints in a printing frame of proper size, but of course, whenever practicable, it is best to use a large dry plate of the size required, fixing it up in exactly the same manner as the sheet of Bromide paper.

In order to make it as simple a matter to obtain an enlarged print as it is to make one by contact in the printing frame, the Stereoscopic Company have introduced an ingenious little apparatus which is called the Snap Shot Enlarger. It is to be used by daylight, and only necessitates placing the negative in the carrier at one end while the Bromide paper is put in the dark slide at the other. The apparatus is then pointed up to a clear sky, and an exposure of about half a minute given with an average negative. The accompanying diagrams show the apparatus open ready for use, and also when closed for storage or transport. A detailed description will be found in the chapter on New Apparatus at the end of this book.

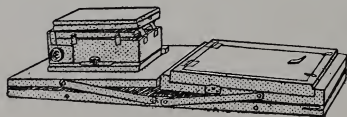


Fig. 39.—Snap Shot Enlarger (closed).

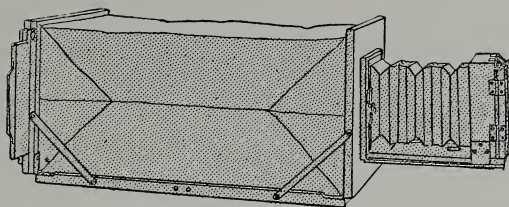


Fig. 40.—Snap Shot Enlarger (open).

Another method of producing enlarged negatives or positives, either upon paper or upon large sensitive glass plates, is rather more troublesome; but it has the advantage of not requiring any apparatus that the photographer does not already possess. In this case, daylight is utilized. The room in which the operations are carried on must have the window completely covered in with brown paper, except one opening the size of the negative, which can be supported in a printing-frame with the back removed. Place a table close up to the window, and by means of a box or shelf support the camera (ground-glass thrown out of the way), so that the lens is central with the centre of the negative, but points away from it towards the room. At a suitable distance from the lens place a white screen, and the image of the lens will appear upon it. Unless the window is high up and has an uninterrupted view of the sky, a piece of card-board must be placed outside it at an angle of 45 degrees, so as to reflect the sky light through the negative. If a positive picture be placed in the frame the enlarged image will, of course, be negative, and if this latter be allowed to fall on a large gelatine plate, it can be developed by any

method to which the operator is accustomed. We trust that these few hints may lead the amateur to experiment for himself, and he will then quickly find what a new power he possesses, even though his camera and lens be small. The Black Band Rapid Rectilinear form of lens is well suited to the purposes of enlarging.

The use of special Enlarging apparatus like that represented on page 75, renders the necessary operations very easy of performance. The apparatus may be roughly described as a much-extended camera and a magic lantern combined. It is sold by the Company with every requisite ready for work, and it certainly represents the most complete and compact enlarging apparatus which has ever been made. Specimens of its work can always be seen at the Company's establishments at Regent Street and Cheapside, and all who have used it are loud in its praise. Everyone intending to make Enlargements should procure a little book entitled "Hints on Enlarging," published by the Stereoscopic Company.

PHOTO-MICROGRAPHY.

ONE of the most interesting branches of photography is that involved in the partnership of the camera with the microscope, and beyond the mere interest of this wedding of two optical instruments, there is the undoubted advantage of undertaking work which can be performed in the

evening, or winter months, when photography in general is impossible. The term "Photo-Micrography" is applied to photographs of microscopic objects which are enlarged in the photographic camera. Micro-photography, on the other hand, is the term applied to photographs of very small dimensions taken for exhibition in the microscope. In this chapter we intend dealing with photo-micrography only.

At first sight, the taking of a photo-micrograph is a very simple matter indeed, and if we merely want a photographic reproduction of a microscopic object, and are not very particular as to its definition or other good qualities, such a thing is very easily obtained. The instruments required are a camera and a microscope. Unscrew the lens from the camera, and place in the opening the tube of the microscope, which has been brought to a horizontal position, having previously robbed the latter instrument of its eye-piece. Screw on to the microscope a one-inch objective, and place upon the stage any common object, such as the proboscis of a blow-fly or the leg of a beetle. Cover the two instruments with a focussing cloth, and, turning the microscope towards the window, or towards the flame of a paraffin lamp, focus the image of the object on the ground-glass screen of the camera, and it will be noticed that, by the usual methods of focussing, a very clear image can be obtained. Indeed, it would be a capital plan for those whose eyes get strained with continual microscopic work, to adopt this method for the mere purpose of viewing ordinary

microscopic preparations, leaving photography out of the question. Such is a very brief *resumé* of the operations which are necessary.

If, however, we want to obtain really good results—and good results are worth trying for when all is said and done—we must take far more pains with our work than in the operations just described. To begin with, we must possess a really good microscope. It need not be crowded with a lot of brass screws and bright parts that are more ornamental than of real use, but the workmanship must be perfect, although it may be as plain as possible. The ordinary student's microscope made on a good model will do all that is needed.

If the operator has not already purchased a microscope, it will be of great advantage if he can have one made or altered to meet the requirements necessary for photo-micrography; and these alterations are so very slight that the extra expense entailed is almost *nil*. To begin with, the microscope must have a firm stand, and if the stand be of the claw form, the feet may, with advantage, be perforated, so that the instrument can be screwed down to a table or base-board. The advantage of this provision will presently become apparent. Then it is a *sine quâ non* that the microscope should readily bend down to the horizontal position. The mirror should be detachable, or capable of being so adjusted as to be out of the way; for in the operations that we shall describe it is not wanted. With regard to the tube of the microscope, it should be short, like most Continental models are made; indeed, we have found

distinct advantage in having it made not more than three inches in length ; that is to say, three inches from the socket into which the objective screws to the opening for the eye-piece. Another tube of about the same length can fit into this short tube so as to bring the instrument up to the normal length for ordinary microscopic observations. The fine adjustment of the instrument is the weak point in most microscopes, English and foreign, but we must make the best of it, such as it is. It consists of a small milled wheel placed in front, or more generally behind the tube of the microscope, and acts by delicately moving upwards or downwards the fitting into which the objectives are screwed. This wheel should move very freely, and, for our present purpose, should be cut with a groove in its milled head sufficiently large to hold a stout silk cord. Let us now turn to the annexed diagram, where the position of the various parts of a complete apparatus for taking photo-micrographs will be readily understood.

The mode of illumination recommended and adopted in the diagram is a paraffin lamp (*l*), which is so fixed upon a heavy stand (*f*) that it can be raised or lowered, so that the flame may be *optically centred* with the rest of the apparatus. This stand (*f*) also serves as the support for a concave reflector, which is also capable of being raised and lowered with the lamp. Next to the lamp comes the condenser. This may be of the ordinary form sold with microscopes, and consisting of a heavy brass disc, into which is screwed a pillar holding the condensing-glass on a universal joint : this is lettered

in our figure (*h*), and immediately behind it and

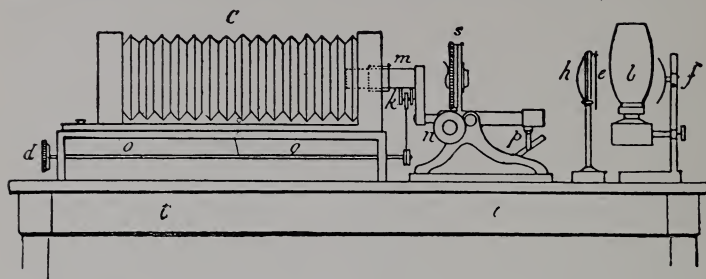


Fig. 41.—Complete Apparatus for taking Photo-micrographs.

hanging to its frame is a small pierced piece of metal plate which acts as a diaphragm. Four or five of these diaphragms, of different apertures, should be provided to suit different objects. Again referring to the cut, *n* is the coarse adjustment of the microscope, *p* is the mirror thrown out of gear, as already described, and *s* is the stage which should be provided with two strong spring-clips, so that the object can be gripped firmly upon it. It is also of great assistance to the operator if the stage be a revolving one; *m* is a short body microscope inserted in the camera *c*. And here another little useful addition to the apparatus may be noted. This is an extra tube to screw into the flange which is already affixed to the camera to hold the photographic lens. This tube should be lined with black velvet, so that in focussing the microscope tube can fit into it easily, and move backwards and forwards as the focussing screws are manipulated. The tube of the microscope should also be furnished, at the time that these operations are being carried forward, with a lining of velvet, to

destroy all reflections which would interfere with the definition, and which would cause unsightly marks on the resulting negatives. This sleeve, it need hardly be pointed out, must have the velvet surface on the inside. The camera *c* is of such a length that the image obtained can be of large size. Here we may call attention to the use of the groove in the screw of the fine adjustment, as already recommended. It will be seen that underneath the camera there is a wooden rod marked *oo*, which terminates exactly under the fine adjustment of the microscope *k*, in a grooved wheel. Over these two grooved wheels (*i.e.*, the wheel on the rod and the wheel attached to the fine adjustment) is tied a piece of strong silk, so that the two are geared together, and when one turns round the other must turn with it. The rod *oo* terminates at the other end in a milled head (*d*), so that as the operator looks on the ground glass of his camera, he can turn this milled head and focus the object to the greatest nicety without moving his position. The whole arrangement is supported on the flat table (*tt*), and should the optical centre of the microscope not quite correspond with the centre of the camera, it can be raised on a piece of board, as shown, by which the correct height can be attained.

It has been held by many that the best light for this kind of work is actual sunlight, and this is, of course, true of most photographic operations; for nothing can equal in intensity the light that we get from the great orb of day. But sunlight (particularly in this country, and more especially in large towns and

cities such as London) is a very scarce commodity—and scarce indeed when the winter months are upon us, during which time the photographer is most likely to take up this kind of work ; and it must be remembered, too, that the actinic power of the sun varies much with the time of year, the time of day, and is affected by various local conditions, so that, if we depend upon sunlight, uncertainty increases at every step. There is another difficulty in using sunlight, of which the beginner will readily see the importance, and it is this : The movement of the earth causes a spot of sunlight, such as we must depend upon for our work, to continually shift its position. If, therefore, we are resolved upon employing sunlight, and supposing that sunlight is at our disposal, we must obtain a mirror working by means of a clock, so that the sunspot shall be apparently still and ready for our purpose. Such an instrument is called a Heliostat, and can be procured at the opticians. We cannot, however, advise the amateur to adopt this method of illumination, more particularly as the paraffin lamp will answer all his requirements, and will represent a fixed quantity of light not subject to variation.

With regard to mounting and preparing objects for photography we need not say much, as full particulars for doing this will be found in any of the large treatises on the microscope, such as those of Beale and Carpenter. There is also an excellent little manual by Davies, which is devoted to this particular phase of microscopic work.

The great thing to avoid in mounting is the use of

a medium that is at all yellow in colour, for it is obvious that a yellow colour causes a great diminution of the actinic power of the light, and, consequently, the necessary exposure is increased to an almost prohibitive extent. If the microscopic objects be already purchased, or in existence, we must, of course, take them as they are, but it is as well to avoid those which are yellow for the reason already given. It is only right to add that the difficulty can be surmounted by the use of what are known as Orthochromatic Gelatine plates, which are rendered by chemical means sensitive to both the yellow and red rays of the solar spectrum, and which will also render blue stained objects in true colour value.

Taking up such a book as the Rev. Mr. Wood's "Common Objects for the Microscope," we shall find that there are a great many ordinary things—minute Algæ, Infusoria, and the like—which, for the transient purposes of photography, need not be mounted, in the usual signification of the term. A great many of these are better placed at once in glycerine and camphor water. This mixture preserves their original form, and obviates any chance of their being spoiled by mildew, &c.; but for further particulars concerning this part of our subject, we must refer our readers to the books already mentioned.

Some microscopic objectives are quite unfit for photographic work, and in purchasing, the purpose for which the glass is required should be plainly stated. An inch objective is, perhaps, the best for a beginner to commence work with; and when he has felt his way with this low power, he may proceed to

adopt powers giving greater magnification. For the large class of what we may call popular objects, such as different parts of insects, the inch is the best to use, simply because its magnifying power is so small compared to that given by higher objectives, that the whole instead of a part only of the object is included in the field of view. The objective should be furnished with the standard screw, now adopted by the various societies and the different makers of microscopic objectives. Its definition should be clear, and it should be free from colour. An inferior objective may often be detected by the yellow colour which it exhibits, and such an objective, especially for photographic work, should be studiously avoided. If the photographer has not been used to microscopic work, he will do well to place himself in the hands of one who is more fortunate ; for there is, perhaps, nothing that can be bought in which the purchaser is so likely to be misled as in the purchase of a microscope. Many are simply made to sell. They look very pretty, and are well finished on the outside, while the glasses are almost worthless, unless we are content to regard the instrument as a mere toy.

There is one difficulty in this work which frightens a great many from taking it up, and that is what is called the difference between the visual and chemical foci of a lens. It would take us too far from our subject to fully explain the reason of this difference, but the effect with some lenses is as follows :—The image given by the microscopic objective may be focussed most carefully, and on the ground-glass screen will appear perfect ; but when a negative is

taken of that object and developed the image will appear blurred. Many microscope-makers now add another lens to their objectives by which this want of agreement between the visual and chemical foci is adjusted, and the beginner will do well to purchase an objective so corrected. If, however, he should already be provided with his objective, and one which is uncorrected, he must have some means of adjusting the matter for himself. Let him proceed thus :—

Focus the image as sharply as possible, then throw it slightly out of focus, and move the fine adjustment screw until the image appears to be surrounded by a red areola. Although it now appears to be indistinct, the chemical focus will be right, and the resulting photograph will be sharp. But this difficulty need not frighten the beginner, for it is one that seldom occurs except when using very low powers ; and, as already pointed out, if the objective has been corrected, the worker need not in any way trouble himself about the matter.

With regard to exposure, very little can be said, simply because this exposure is governed by a variety of circumstances. The amateur photographer knows that this is the case in ordinary photographic operations, and if he will bring the knowledge he has acquired to bear upon these less familiar operations with the microscope, and will mix his observations with a little common sense, he will, after a few trials, soon be able to master this part of the subject. Some objects will require only a couple of minutes' exposure, others may want ten minutes or more, but

this must always be a matter of judgment and experience.

With regard to the use to which negatives obtained by the help of the microscope may be put, our advice is to print them on glass, and to use them as lantern-slides. A vast amount of ingenuity has been spent by different workers in contriving lantern-microscopes which shall show before a large audience a disc of many feet in diameter, bearing the image of an ordinary microscopic object. Such instruments can only have limited success with the present mode of illumination at disposal. The rays of the most powerful form of lime-light, if made to pass through an object which is perhaps only one-sixteenth of an inch in diameter, are so attenuated when they reach the screen, that the image, although full of definition, is very poorly illuminated. The advent of some form of electric light for the lantern, if such a thing can be invented, will at once put a changed face on the matter, but, at the present moment, the best lantern-microscope made is only fit for a very small lecture-room.

Now, let us point out the advantage of using these photo-micrographs as lantern-slides. They can be taken direct, of the standard size, $3\frac{1}{4}$ in., and developed with iron, so as to present a black and white image. Through this image the lime-light, or even an oil-light, will send its rays with little obstruction ; at any rate, with no more obstruction than they meet with in going through an ordinary lantern-slide. The photograph, if properly focussed and made with good apparatus, will be full of the most exquisite detail,

and when it is enlarged, as it easily can be with the lime-light, to a disc of 15 ft. or more in diameter, or by an oil lantern to a diameter of 4 ft. or 5 ft., its beauties, instead of being reduced, are made more evident. Those who take up photo-micrography have, therefore, the means at their disposal of showing their microscopic preparations to the greatest possible advantage ; and, moreover, its practice represents a very pleasing way of spending a few hours of leisure when other photographic work is next to impossible.

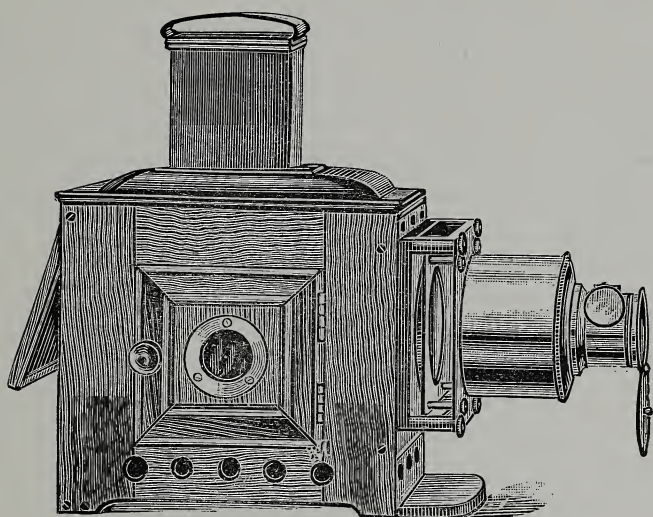


Fig. 42.—The Stereoscopic Company's "Drawing Room" Lantern, suitable for microscopic projections.

PART III.

INSTANTANEOUS PHOTOGRAPHY.

ONE of the most fascinating phases of modern photography is comprised in what is known as "instantaneous" work. The word "instantaneous" is rather a misnomer, for there is really no such thing as an instantaneous photograph. Such pictures are usually taken in a small fraction of a second, but still, that fraction does represent a certain duration of time. Seldom are pictures seen which have been taken with a less exposure than the one-hundredth part of a second, although certain photographs have been taken by means of special and complicated apparatus in even less time than that.

The beginner is apt to imagine that instantaneous work must necessarily mean special and costly apparatus, but this is not the case. With a rapid gelatine plate, such as those supplied by the Stereoscopic Company, an instantaneous photograph can be taken quite as easily as a photograph of any still object. The one great requisite in this class of work is brilliant light; for the exposure is so greatly shortened, that all the light possible to be had must be enrolled in the service. For this reason amateur

photographers should not attempt to obtain instantaneous pictures except in the spring or summer time, and only during those hours of the day when the sun is at its brightest. These remarks do not, of course, apply to more fortunate countries, where the sunlight is a commodity that need not be looked upon as a very scarce gift of fickle fortune.

It is, of course, obvious that very brief exposures cannot be made by means of the ordinary lens cap, so that, next to a good lens, the first requisite is some form of mechanical exposing device, more commonly known as an "instantaneous shutter." By means of this, exposures of varying speeds may be made, the lens being automatically opened and closed without risk of moving or shaking the camera. Hundreds of patterns of these shutters have been introduced during the last few years, some of them being marvels of scientific mechanism, while others are merely a few bits of mahogany and brass. One of the most simple is called the drop-shutter. It consists of a frame of wood, with an orifice in it, which fits upon the hood of the lens. In this frame is a groove, in which there drops a light piece of wood or vulcanite, with a corresponding aperture pierced in it; this shutter is released by a trigger, so that in falling the aperture in the moving part rapidly passes the lens aperture, and during that brief fraction of time the photograph is taken. The speed of such a shutter can be, and usually is, increased by the attachment of an india-rubber band. Simple and efficient as this shutter is, it possesses several disadvantages. In the first place, its length

prevents its being easily packed in the camera case; secondly, there is no precise method of regulating the duration of the exposure; and, lastly, it is often not applicable to modern landscape cameras, in consequence of the projecting baseboard not allowing room for the moving piece to fall.

A much more convenient form is that known as a roller-blind shutter, of which the popular Thornton-Pickard is, perhaps, the best known example.

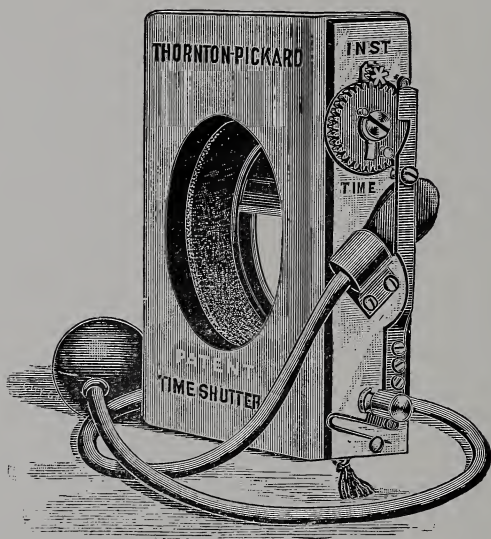


Fig. 43.—The Thornton-Pickard Shutter.

Here we have an opaque flexible blind, more than three times the diameter of the lens in length, having an aperture in the centre rather larger than the diameter of the lens itself. This blind is

attached to two rollers, one of which contains a fairly strong spring, enabling the operator to roll the blind lightly upon the roller; the other roller has no spring, but is provided with a catch or detent, controlled by the pneumatic ball and tube (shown in the illustration.) To use the shutter, the small tassel shown at the bottom is pulled out until the whole of the blind is rolled upon the upper spindle, and the spring in the lower one is, consequently, in a state of tension. On pressing the ball, the detent is released, and the blind allowed to roll itself upon the spring roller, the aperture flashing across the lens with greater or less rapidity, according to the strength of the motive spring. This can be regulated to give any speed between the fifteenth and the one-hundredth part of a second, while, by a simple movement of the detent lever, "time" exposures of any duration may be given; that is to say, the aperture will remain opposite the lens as long as the ball is kept pressed, but on releasing it the shutter instantly closes.

For the most rapid exposures up to the $\frac{1}{500}$ part of a second, a special type of blind-shutter, known as the "Focal-Plane," has been commercially introduced by the Thorton-Pickard Company. It is somewhat similar in construction to the ordinary shutter, but has merely a slit across the blind, this latter being arranged to work inside the back portion of the camera, and as near as possible to the surface of the plate. The great increase of speed gained by this device will be readily appreciated, when it is pointed out that a slit $\frac{1}{10}$ of the width of the plate

to be used passes entirely across the surface in $\frac{1}{50}$ of a second, that any given portion has only received an exposure of $\frac{1}{500}$ of a second. This form of shutter is not adapted for general use, as it does not permit of even moderately slow exposures, but for special subjects, such as jumping horses, studies of athletes, &c., it cannot be surpassed.

A more highly finished, and, consequently, more expensive form of "blind" shutter is that known as the N. & G. It is somewhat similar in general design to the instrument just described, except that the regulation of speed is effected by means of a pneumatic piston and adjustable valve, instead of by altering the tension of the spring. This shutter is beautifully made in alluminium, and is undoubtedly the best of its class.

Another beautiful shutter comes from across the Atlantic. It is known as the "Bausch & Lomb," and can be fitted to any good lens. While not being unduly complicated, it gives not only every variation in time of exposure, but also in size of diaphragm, for in this arrangement the Iris diaphragm of the lens is also the instantaneous shutter. The aperture of the Iris is determined by setting a small scale at the top of the shutter, while the speed is regulated by the aid of a little dial in front, exposures varying from $\frac{1}{100}$ of a second to 3 seconds being thus obtainable; a small lever further permits of longer exposures being made, in this case, one pressure of the pneumatic ball opens the lens, while another closes it. It might be expected that so perfect an exposing apparatus would be bulky and possibly

unsightly; a glance at the annexed illustration will, however, show that it is not only small in size, but is actually an ornamental addition to the camera.

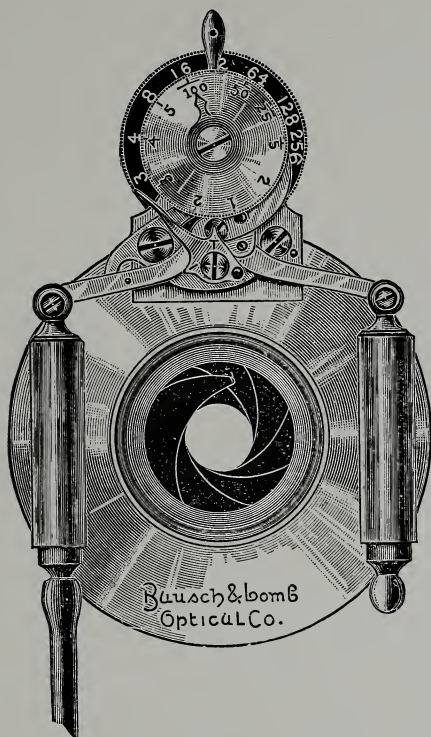


Fig. 44.—Bausch and Lomb Shutter.

The Stereoscopic Company have such extensive means of procuring all the best apparatus in the market, that they have constantly submitted to them shutters of various patterns, and therefore the purchaser has the choice of a great number, and he

is advised to see these for himself, and have their various points explained to him, before he ventures to decide on any particular kind.

Great care must be exercised in the development of instantaneous pictures, and the following remarks by an adept at this work cannot fail to be useful to our readers. There is a very unfortunate and careless way of using the terms rapid, instantaneous, strong developer, weak developer, and the like, which must always lead to confusion. One operator will call an "exposure" rapid when he uses the smallest stop and exposes by taking the cap off and replacing it quickly by the hand. Another will use a medium stop and the same method of exposure. Still another will use a large stop and a drop shutter, or even a rapid shutter at full speed. Now, it is obvious that the development required is entirely different in each of these cases, always assuming the light to be the same in every instance. But here again is another difficulty,—the light is often not the same. One person talks about making exposures with bright sunlight on objects upon the water, or views where water forms a large proportion of the picture, while another refers only to groups or landscapes where water is absent. In these latter cases an entirely different treatment in development is necessary to secure good negatives.

As is well known, the amount of light that reaches the plate will determine the quantity of actinic work done upon the sensitive surface, and this in turn will determine the amount of work to be done by development. Therefore, the actinic power of the

light being the same in both cases, more work is done upon the plate with a large stop than a small one, the time of exposure being the same; and, when a large quantity of actinic energy has thus acted, the developer will have less work to do as its share of the production of the negative. If a small stop is used, the time of exposure being the same, the actinic work done will be small, and the work done by the developer will have to be great. In discussing the question of the development of rapid exposures, it is, therefore, absolutely necessary to come to some understanding as to the meaning of the term "instantaneous" as applied to them. Leaving out of the question the actinic power of the light at different seasons of the year and hours of the day, we must confine our attention to the problem in hand—the proper developer to apply to a plate that has received much or little light-action in a given time. For, the speed of the exposure being the same, the amount of light received by the plate determines the force to be applied in the development. The question of the actinic power of daylight is one of individual judgment, and no amount of writing or discussion can impart this. But the circumstances under which the light is acting are pretty well defined, and can be in a measure formulated. In landscapes, in summer, the the greater number of rays that reach the sensitive plate are of the less actinic character,—greys, browns, greens; while in winter landscapes, with snow, we have more of the actinic rays. In marine views, on the other hand, the reflections from the water

bathe the objects in a perfect flood of light, consisting of rays of all characters; and, furthermore, the objects upon the surface of the water generally reflect more white and less of coloured light than those upon land. From a consideration of these facts it is evident that, given the same exposure, more actinic work will be done upon a plate exposed upon subjects on the water than upon those on land. It is, therefore, necessary to acquire some idea of the amount of work done by the light upon the plate, if we are to apply the developer rationally and secure good negatives.

Having given some idea of the considerations to be remembered while making the exposure, we will now take up the question of development, and at the very beginning let us say that we do not want to talk about under-exposed plates. The plate that has not received enough light-action to give a picture in twenty minutes under development, is not worth the time spent on it. We do not here mean that a thin picture is not worth working at, but a picture that lacks detail. You may have a thin picture with plenty of detail, and this will give a good negative under proper treatment; but a plate that has received too little actinic action will never give a good result. Some one will naturally ask, "Well, what is the correct amount of exposure?" Our answer is that it depends entirely upon the brand of plates you use. Some plates are so sensitive that a medium stop and a rapid shutter will give sufficient exposure at four o'clock in the afternoon of a summer day, with fairly good (not bright) light, and will result,

with only five minutes' developing, in a good negative. This is true of the most rapid plates now made. With less rapid plates, and the same exposure, the lens would have to be nearly wide open; while with many plates, and the latter exposure, no picture would appear in thirty or forty minutes. Such plates we should call under-exposed, and their destiny would be the waste-box.

Nothing but a few experiments with a given brand of plates will teach one how to use them. It is folly to set down any hard-and-fast rule for all kinds of plates. During the time of the experiments on exposure, great care should be taken to form a judgment of the quality of the light and its mode of falling on the subject.

There is nothing mysterious or unusual about the development of instantaneously exposed plates. Many an old hand at pure landscape and portrait work has been deterred from attempting instantaneous shots on account of fancied difficulties in development; this should not be. Hundreds of people, who know nothing of photography, purchase hand cameras, expose nearly all their plates upon moving objects, and, in spite of the general ignorance of the science, produce a large proportion of successful pictures. As a matter of fact, if the plate is sufficiently exposed, the after procedure is the same as for ordinary time exposures; if under exposed, no amount of developing will bring out detail, although some little judgment must be exercised in restraining increase of density while securing all the detail which the given exposure will yield.

For those who rather strive after the production of really good negatives, than the possession of unsullied finger nails, there is no developer which will give such uniformly satisfactory negatives as Pyro and Soda, compounded according to the formula at the end of this book. For plates which are believed to have received an adequate exposure, one drachm of the Pyro solution, one drachm of the Soda solution, and six drachms of water, may be used to make each ounce of developer required. With very rapid plates, and particularly with evenly illuminated subjects, a few minims of a ten per cent. solution of Bromide of Potassium may be added with advantage. If there is any considerable proportion of heavy foliage in or near the foreground the Bromide should be omitted. In subjects with strong contrasts, and in case of under exposure, the amount of Pyro solution may be reduced to one half, or even less, and in cases of flatness or apparent over exposure, it may be doubled, or even trebled, with advantage. The use of the concentrated solutions permits of great variation in the strength of the developer, without materially altering the volume of solution.

There is a natural tendency on the part of the novice to imagine that a very short exposure necessitates the use of a strong developing solution, this is entirely wrong. The tendency of a developer, containing a large proportion both of the reducer and accelerator, is to rapidly produce a dense deposit in the high lights of the picture. Now this is exactly what is not wanted, a weak solution, allowed to act for a much longer period, producing something

much nearer a perfect result. It is worth trying the experiment of developing a pair of exactly similar exposures, using for one a normal developer, and for the other a solution composed of one part of normal developer and two parts of water. The operator will find that he has gained an immense control over the character of his negative.

Nearly all the newer developers will give good results when used for instantaneous work; Amidol and Metol being, perhaps, the most satisfactory. Hydrokinone is rather too apt to increase contrast to be recommended, although, in skilful hands, it will answer as well as the others.

All these developers are better if controlled by the addition of Bromide, rather than by alteration of the relative proportions of their constituents. As they are tolerably rapid in their action, it is wise to have two dishes ready to hand, one containing full strength freshly mixed solution, while the other should be filled with a previously used developer, or one well restrained with Bromide. The exposed plate may then be transferred from one to the other as circumstances may render necessary.

It will often be found that it is impossible to obtain sufficient density with plates which have received extremely short exposures; in such cases after Intensification will be more satisfactory than the prolonged use of a strong solution which may only cause fog.

HAND CAMERAS.

BEFORE the introduction of the modern rapid dry plate, it would have been deemed almost impossible that any one could have sallied forth equipped with an apparatus capable of yielding first-class photographs, and have manipulated it in the busiest thoroughfare without exciting suspicion. Now, however, we have become so used to the concealed camera, that on a bright day we look askance at the most innocent book or parcel, for fear that we may be caught in an ungainly attitude, and our pose transferred to paper for the delectation of our friends and the public generally. The disguises of the detective camera are various and their name legion, silk hats, hand bags, dispatch cases, picnic baskets, parcels of books, single volumes, opera glasses, and even baskets of flowers have, in turn, sheltered cameras, while new forms are every day brought under our notice.

Many amateurs now commence their photographic experiences by purchasing a hand camera, and there are but few who have practised the art for any length of time, who are not the possessors of such an instrument. The size most in favour is the quarter plate, so that portability is secured and the expense of working reduced to a minimum, while the sharpness of the negatives will usually permit enlargement to any reasonable size, say to 15in. \times 12in.

Nothing but the finest workmanship is admissible in a hand camera. The lens must be of the highest

class, capable of covering the plate to the edges, even when used with full aperture, the shutter must work smoothly and with precision, the focussing arrangements must be convenient, and the dark slides and camera itself perfectly light-tight, as the focussing cloth is necessarily dispensed with.

The Stereoscopic Company has made the production of hand cameras a special feature of their business, and have always a large assortment of the newest and most efficient instruments on view.

In no camera have these qualities been combined in so perfect a manner as in the Stereoscopic Company's "Binocular Hand Camera," the enormous success of which is at the same time a proof of the good judgment of the photographic public, and a tribute to the sagacity and enterprise of the Company which has brought it so prominently before the public.

The Binocular camera is a complete photographic apparatus, containing within the space occupied by a small field glass, a Rapid Rectilinear Lens of the highest quality, an instantaneous shutter, and one dozen prepared dry plates or thirty films. There is also a finder or sighting glass, which permits of the exact size and appearance of the proposed picture being seen at the time of pressing the button. The size of the plate taken is shown by the accompanying illustration (see page 117). The plates are automatically and instantaneously changed by pulling out a small rod at the side of the Camera.

The shutter is also arranged to give time exposures, so that, besides taking pictures of moving objects in

a good light, the Camera can be used for home portraits in ordinary rooms, interiors and outdoor work in dull weather.

One very important advantage possessed by this instrument over all other Hand Cameras is found in



the fact that in consequence of the Binocular being held up to the eyes whilst the picture is being taken (see Fig. 45), the resulting photograph exactly represents the view as seen by a person of ordinary stature, and not as it would be seen by a child three feet high. This effect is admirably shown by Figs. 46 and 47, which are engraved from photographs taken at these two different elevations.

Fig. 45.—The Binocular Camera as used to take the picture shown in Fig. 46.

Although the negatives are necessarily of small dimensions, they are of such exquisite sharpness that they will bear enlarging to a considerable extent without appreciable loss of definition. This is most

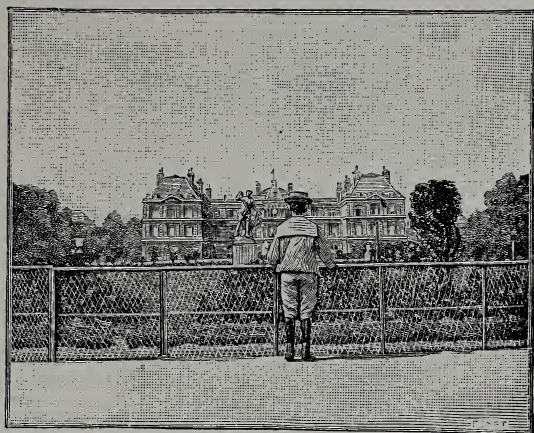


Fig. 46.—View taken from the usual position in which Hand Cameras are held.

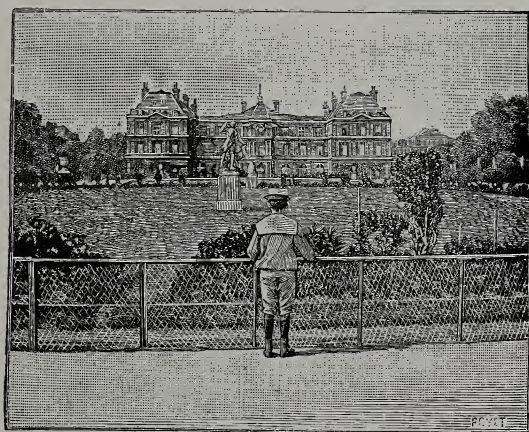


Fig. 47.—The same View taken with the Binocular from Operator's line of sight.

conveniently done by means of the special Enlarging Apparatus illustrated on page 121. The focus of the Lens in this is permanently adjusted, and it is only necessary to place the negative in the frame at the one end and the Bromide Paper or film in the other, and give a brief exposure to daylight. Thus it is actually as easy to make a print upon paper 7×5 inches as it would be to make one by contact in an ordinary printing frame. Nor is the Enlarging Apparatus itself a heavy or bulky instrument, measuring as it does only $8\frac{1}{2} \times 8\frac{1}{2} \times 6\frac{1}{4}$ inches, and weighing less than $3\frac{3}{4}$ lbs. It is, of course, understood that the Enlarging Apparatus is kept in the laboratory, the camera only (weighing 19 ozs.) being required in the field.

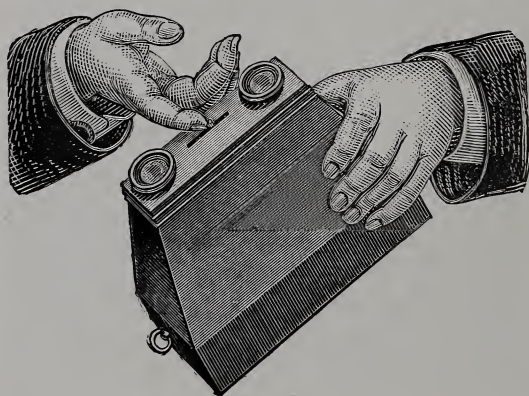


Fig. 48.—Setting the Shutter.

The small negatives answer admirably for printing lantern slides by contact, or prints from the same may be used for illustrating a diary or letter.



Fig. 49.—Taking the Picture.

The ease with which this camera is worked will be apparent when it is seen that only three simple movements are necessary for each exposure. They are :—

1. Setting the shutter
2. Taking the picture (sometimes called “pressing the button”)
3. Changing the plate

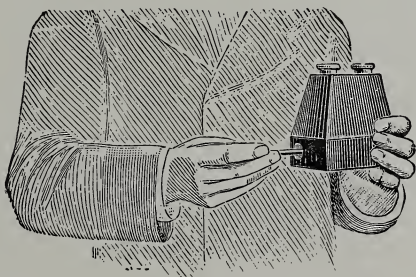


Fig. 50.—Changing the Plate.

Although primarily a hand camera (perhaps we may say *The Hand Camera*) the Binocular is equally available for use upon a tripod. The accompanying block showing a neat little rest or holder, by means of which it may be secured upon any tripod stand or convenient resting place.

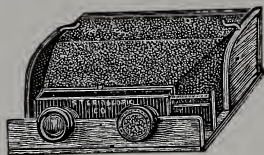


Fig. 51.—Rest or Holder.

If a more rapid lens is required than the excellent Rapid Rectilinear usually supplied, the camera can be fitted with one of the magnificent anastigmats of Zeiss; this is a doublet of five lenses working at F6.3, and covering the plate with microscopic sharpness with that great aperture.

The size of plate used in the small (or No. 1 Binocular) is $2\frac{5}{16} \times 1\frac{3}{4}$ inches, and as this is somewhat small, if the pictures are not to be subsequently enlarged, the Stereoscopic Company induced the inventor to design a larger Camera upon identical lines. The result is seen in the No. 2 Binocular, which carries 18 plates, $3\frac{1}{2} \times 2\frac{1}{2}$ inches, or about carte de visite size. The plates are exactly the right measurement for printing lantern slides of artistic proportions by contact, and will also yield excellent enlargements up to 15×12 inches. Films may, of course, be used in any of the Binocular Cameras, although the small size of the plates permit a large

number of exposures, without seriously increasing the weight of the owner's luggage. Nor is the usefulness of the Binocular Camera limited to work of the "Snap-Shot" order. The scientific worker may use it for time exposures at close quarters, to make photographic records of plants, fossils, or small animals, or pictures of racial types can be secured without attracting the notice of the subject. The means by which this is accomplished is described in the following way.

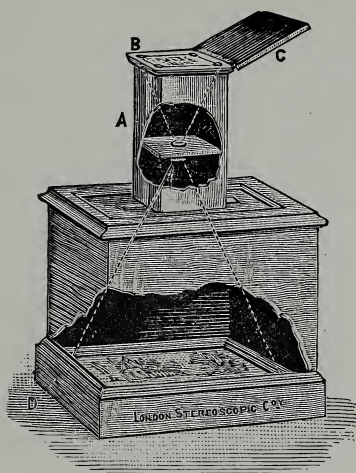


Fig. 52.—Enlarging the No. 1 Binocular pictures to 7×5 inches.

The Binocular Camera is of the class known as "fixed focus," that is to say, the lens is permanently adjusted to take sharp pictures of all objects situated *beyond* a certain distance. In the No. 1 ordinary Binocular, this distance is about 6 feet ; in the No. 1, fitted with Zeiss lens, about 10 feet ; with the No. 2

ordinary about 10 feet; and with the No. 2 Zeiss lens about 15 feet. Objects nearer than these distances will be rendered more or less indistinctly, so that it is impossible to take bust portraits, small animals, pictures, &c., at close quarters. To overcome this difficulty, the Stereoscopic Company have provided sets of supplementary lenses, which they call Magnifiers, which are to be placed in front of



Fig. 53.—Portrait taken with the No. 1 Binocular at 3 feet.

the photographic lens when photographing near objects. These lenses are sold in sets of three in a neat leather case, and allow pictures to be taken at distances of three, six, and nine feet, respectively. The definition at intermediate distances is fairly good, but absolute sharpness is guaranteed at the distances engraved upon each Magnifier. This addition does not interfere with the angle included in the finder, so

that the exposure may be made in exactly the same way as when using the Camera without it; nor is the rapidity of the lens in any way lessened.

The accompanying engravings clearly show the great value of the Magnifiers, in increasing the range of focus of the Binocular Cameras.



Fig. 54.—Portrait taken with the No. 2 Binocular at 3 feet.

A very carefully written book, descriptive of the "Binocular Cameras and how to use them," and containing full instructions for developing and enlarging, can be had separately on application.

TWIN LENS CAMERAS.

FOREMOST among hand cameras carrying larger plates than those used in the Binocular, will be found the splendid series of instruments introduced by the Stereoscopic Company, under the name of the Twin Lens Carlton Cameras, which may be briefly described as hand cameras fitted with two lenses, working conjointly. The upper lens for focussing the subject to be photographed, and the lower one for projecting the image on to the plate or film, or in other words "taking the photograph." One of the foremost authorities on modern photographic practice has said, that "when a hand camera is constructed on the "Twin Lens" principle, it ceases to be a toy and becomes an instrument of precision."

The very term of "Shap-Shot," so commonly applied to hand camera pictures, in itself implies that an element of chance is always present, and that satisfactory results are more frequently due to good luck than to careful manipulation. Who has not looked through a collection of such "Snap-Shots," and listened to the excuses and regrets of the producer, as he explains that he "thought that he got this or that figure all in, that the boat seemed quite near, and that he did not expect the central object would have come out so small;" or, deploring the fact that the best subject of all was ruined through forgetting in the excitement of the moment to adjust the focus, a scale being used entirely independent of the image on the finder, which is always sharp

whether the focussing indicator be set at five feet or fifty? Nor must it be supposed that beginners only are liable to these mistakes, for the contrary is proved by the readiness with which Twin Lens Cameras have been adopted by many of our leading workers. Captain Hayes, the most skilful exponent of equine photography, says of the Stereoscopic Company's Twin Lens Artist Camera, that "it is the only one with which you can take the *portrait* of a horse. It is easy enough to take *photographs* of horses with any hand camera, but to secure a portrait showing the characteristic points of a particular animal a full sized focussing finder is essential." In his little *brochure* on Animal Photography, Mr. Gambier Bolton, F.Z.S., also bears testimony to the merits of the Twin Lens system. In photographing groups, or even single portraits, particularly of children, the Twin Lens Camera is almost indispensable; for not only can the pose be arranged as carefully as with an ordinary camera, but the most restless subject can be accurately focussed, and the exposure made the moment a favourable expression is assumed. Another argument in favour of the full sized finder is to be found in the fact that the image given by the two lenses being identical, the actual size in the photograph of distant objects can be accurately gauged. Those who have had much experience with hand cameras of the ordinary type know that it is difficult, if not impossible, to judge of the correct distance at which to take yachts, distant mountains, and similar subjects. The tendency of the small finder is to exaggerate the size of all objects in the near fore-

ground, and to dwarf the distant. The eye gives, on the other hand, more importance to the distant objects, and often entirely neglects those near which show prominently in the photograph: hence it is clear that the lens itself, or an exact duplicate, is the only view meter which will give an accurate idea of what the proposed picture will actually show upon the plate.

It has been urged, by some photographers possessing a considerable knowledge of the subject, that the use of a pair of identically similar high class lenses is unnecessary, and that the finder lens may be a single one of the ordinary landscape type, provided only that it be achromatic and of the correct focus. Theoretically this is correct, but it is true only of lenses working at equal apertures, that is to say, that if the finder lens be stopped down to F_{11} (the largest aperture at which a single lens will give critically sharp images), the Rectilinear or working lens must be stopped down to the same aperture, in order that the two objectives may possess as nearly as possible the same depth of focus. Anyone who has used a modern Euryscope lens (such as the Twin Lens Cameras are fitted with), will know that when working at full aperture, say F_6 , a touch of the focussing rack is sufficient to put the image in or out of focus, while with the same lens working at F_{11} , an appreciable movement is necessary before the object once sharply focussed becomes indistinct on the screen. It will thus be seen that if there is to be any disparity between the apertures of the two lenses, that of the finder lens should be the larger,

and the plan adopted by the Stereoscopic Company is the correct one. The Twin Lens principle is not a new one, the first cameras having been constructed, some time ago, for the study of clouds. Later on, studio cameras were made with Twin Lenses for photographing children and nervous sitters, but it was reserved for the Stereoscopic Company to introduce a really successful and practical Twin Lens hand camera. The Artist was the first of this class, and, after being before the photographic public for several years, is still a prime favourite, but as the use of dark slides is thought by some to be objectionable, the Company have introduced a new Twin Lens Camera, called the Carlton, containing a magazine to carry a dozen plates or films in sheaths, the changing being effected by means of such simple and effective mechanism, that the whole twelve can, if desired, be exposed within a minute. Details of construction, and method of working both these cameras, will be found in the following pages.

THE TWIN LENS ARTIST CAMERA.

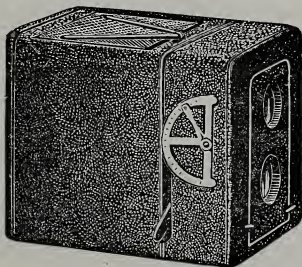


Fig. 55.—The Twin Lens Artist Camera.

Externally, this Camera presents the form of a cubical box, covered with morocco leather and fitted with a handle for carrying. The opening for the lenses is covered by a tightly fitting door, and the hood covering the large focussing screen closes flush with one of the sides. When the camera is to be used, the catch of the door in the front is released, and it at once flies open revealing the two lenses, and allowing them to be racked out to a considerable extent for photographing near objects. On turning the button which secures the hood of the finder, this is at once erected and held in position by the rubber band (as shown in Fig. 57). If we now direct the lens towards any well lighted object, a projected image of the full size, and an exact fac-simile of that which the camera will take, will be seen upon the ground glass of the finder (or focussing screen); the subject can be sharply focussed by means of the handle at the side, which actuates a rack and pinion in the usual way, and all who have used the ordinary single lens hand camera will at once see what an immense advantage this gives to the operator. In order that objects quite near to the camera, say at four or five feet distance, may be sharply defined, the lenses are fitted in sliding tubes, so that they can be drawn out to a certain extent and clamped, before focussing with the lever at the side. This, while securing a great range in focussing, does not necessitate making the camera longer or heavier, as would be the case if the adjustments were effected entirely by the rack and pinion.

The Lenses are Euryscopes of exceptionally fine

quality, working at F6·5, and covering the plate well to the edges. Waterhouse diaphragms are usually fitted, but the Iris can be added at a small extra cost.

The Dark Slides are of an entirely new pattern, and are remarkable for their lightness and portability. The fact that there are no sliding shutters or hinged joints permits of their being exposed, when closed, to full sunlight without risk of spoiling (or what is generally termed "fogging") the plate, through the joints not being light proof.

The Shutter is of the well known and reliable roller blind pattern. It is fitted with a regulating brake, so that either very rapid or moderately slow exposures may be given. A separate button is provided for giving time exposures.

As it may sometimes be found necessary to use the camera upon a tripod stand of the ordinary height, it has been deemed advisable to supply each camera with a loose focussing screen, which can be placed in the groove usually occupied by the dark slide. This permits of the focussing being effected in the same way as when using an ordinary stand camera, an advantage obvious to any experienced photographer.

It should be noted that although capable of holding two ordinary glass dry plates in each dark slide, they are so compact that a number can be carried in a very small compass, the thickness of each being only half-an-inch. They are also especially adapted for carrying cut films, which are rapidly gaining favour, and which promise shortly to supersede glass plates in all cases where portability is a desideratum.

Rollable Films. The Twin Lens Artist Camera

can easily be adapted to take a roll-holder for carrying a spool of film, without in the least interfering with the use of the dark slides, thus retaining to the full the advantages of both systems.

The cameras have fittings for screwing upon the tripod, in either a horizontal or vertical position.

Attention is particularly called to the fact that this camera is made in larger sizes than are usually found in hand cameras, half-plate, $7\frac{1}{2} \times 5$, and whole-plate, being kept in stock. These sizes commend themselves to those photographers, professional as well as amateur, who aim at the highest quality of work, and who do not consider lightness the only thing needful in a camera. For animal portraiture, marine work, and, in fact, all classes of instantaneous photography, the Twin Lens Artist possesses manifold advantages over any other instrument.

*INSTRUCTIONS FOR USING THE TWIN LENS
ARTIST CAMERA.*

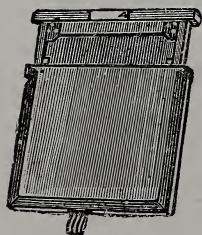


Fig. 56.—Dark Slide of Artist Camera.

Filling the Dark Slides.—To fill the dark slides, withdraw the plate-holder from the sheath (Fig. 56) and drop one edge of the dry plate into the holder

under the two fixed metal catches at the top corners. Then press the plate down at the bottom, so as to allow the other two catches to pass over the lower corners of the plate. If films are used, pieces of cardboard must be inserted in precisely the same way as the plates, and the films placed on the top of the cards. Metal carriers specially made for the purpose are to be had, and are preferable to cards. Care must be taken that the sensitized or dull surface of the film or plate is placed outwards. *This must be done in a room where the light is from a lamp guarded with a ruby screen, and the sheath replaced before the slides can be brought into daylight.*

The slide must now be inserted in the back of the camera in the groove adapted for it, and the back lid closed and fastened with the two brass bolts.

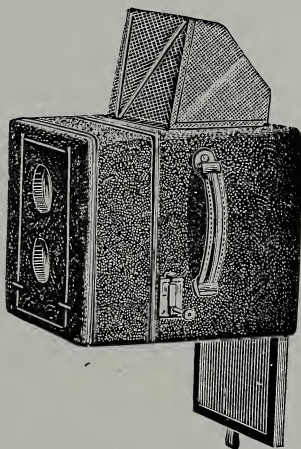


Fig. 57.—Dark Slide set ready for exposure.

Setting the Shutter.—*For Instantaneous Exposures.* To set the shutter pull out the brass rod at the left hand side of the camera, to which a ring (or cord) is attached, as far as it will go; two distinct clicks should be heard. Then pull down the sheath of the dark slide as far as possible (Fig. 57); open the door in front of lenses; take caps off both lenses, and release the hood of the finder at the top of camera.

N.B.—The sheath must *not* be pulled down *before* the shutter is set.

For Time Exposures the shutter should be set as for instantaneous work. The exposure is made by pressing the lower of the two buttons at the side, which will open the lens. When the requisite time has elapsed, a second pressure on the button will close it. For time exposures, the camera must be placed on a solid basis or tripod stand, the latter being more practical and convenient.

The Speed of the Shutter can be regulated by the small milled-headed screw on the left side of camera, which must be turned from left to right to decrease the speed, and *vice versa* to increase it. Each number represents about 10 per cent. extra rapidity.

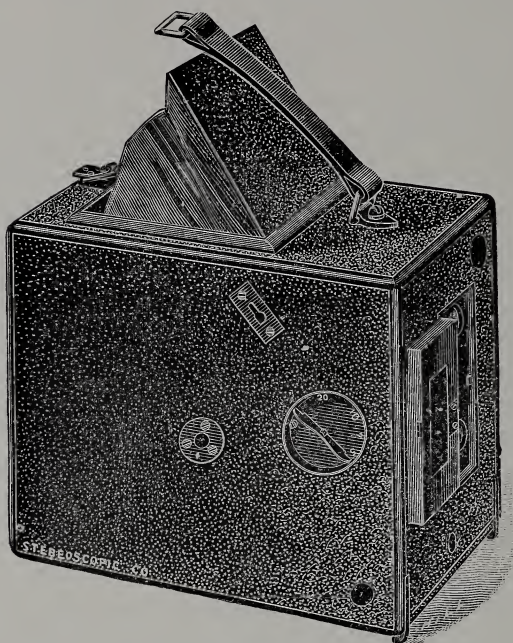
Focussing.—Focus by carefully and slowly moving with the thumb the milled-headed arm which works round the scale on the right hand side of camera (see Fig. 55), until the picture to be taken is quite distinct or sharp on the ground glass of the finder. Then release the shutter by pressing the upper of the small buttons placed over the rod which sets the shutter (at left). After the exposure immediately replace

sheath of dark slide; open back of camera and reverse the slide ready for the next picture.

When necessary to focus objects nearer to the camera than three yards, the small clamping screw on the side of the lens mount must be loosened, and both lenses pulled out *as far as they will come*. The screw must then be re-tightened. See that the lenses are either pulled out to the full extent or pushed right home.

The numbers engraved on the semi-circle under the focussing arm denote distances in yards. In case of any accident to the finder, the focussing may be effected by setting the notch in the arm to the distance of the object which it is desired to render most sharply.

To insert the Stops or Diaphragms, take out the lower lens, loosen the small screw fixed in the mount of lens, and draw out the inner tube holding the glasses; this will leave the slot free for the reception of the diaphragm. The lens must be put back into its original position before using. Iris diaphragms can always be fitted at a slight extra cost. It must be remembered that the speed of the shutter must be decreased, in proportion to the smallness of aperture of stop used.

THE TWIN LENS CARLTON CAMERA.

BY ROYAL LETTERS' PATENT.

Fig. 58.—The Twin Lens Carlton Camera.

This instrument has been constructed to meet the requirements of those who prefer the magazine type of hand camera. The facility with which the plates may be changed makes the Carlton especially suitable for taking a series of negatives of a yacht race, procession, or any other subject, where the exposures must be made in rapid succession. The objection to automatic changing cameras has hitherto been the liability to jamming, which has been noticeable

in some forms, while in others, the sensitive surface has been abraded or covered with dust from the grooves in which the plates travel. These difficulties have been entirely overcome in the construction of the Carlton. The plates are fixed in sheaths, and turn over after exposure much in the same way as a reader turns the leaf of a book.

The following structural particulars of the Twin Lens Carlton will give some idea of the substantial and scientific manner in which the inventor's ideas have been carried out :

The Body of the camera is made of well seasoned mahogany, covered with real morocco leather. The exterior fittings are of oxidized metal, and are, therefore, not liable to rust or tarnish, at the same time they are unobtrusive in appearance. The outside is absolutely free from all projections, the carrying handle alone excepted.

The Lenses are Euroscopes of exquisite quality, the lower one being fitted with an "Iris" diaphragm, the scale of which can be readily seen without opening the front of the camera.

The Finder is screened by means of a large hood, so that focussing can be done as easily in bright sunshine as in the studio, the large aperture of the finder lens (F5.6) materially helping to secure this result.

The Instantaneous Shutter is of the "safety" type, *i.e.*, the plate does not require protecting while the shutter is being set. The exposure can be regulated by adjusting an index to the required speed upon a graduated scale, and any number of similar consecutive exposures may be given with one adjustment.

Instantaneous exposures are given by pressing a trigger up, and time exposures by pulling a differently shaped trigger down, so that it is almost impossible to give an instantaneous exposure in mistake for a time or *vice versâ*.

The Plates are held separately in metal sheaths, and these sheaths are firmly held by the lower corners during the whole time they are in the camera, thus doing away with all risk of breakage or scratching. A suitable arrangement of springs holds the plates in the correct position for exposure, while the exposed plates are firmly held between rubber pads in the bottom of the camera. Celluloid films may be substituted for glass plates, if desired, and the fact that the sheathes do not slide on each other while changing, but, as mentioned, turn like the leaves of a book, prevents the possibility of injury to the surface of the films, even if the latter are not perfectly flat. One simple movement of a rod changes the plate and registers the same upon a numbered disc. It is not necessary, as in nearly all other magazine cameras, to have the entire number of plates or sheaths in position to ensure accurate working, as the Carlton will work perfectly with one sheath.

INSTRUCTIONS FOR WORKING THE TWIN LENS
CARLTON CAMERA.

Filling the Camera with plates.—Take the camera into the dark room and stand it upon the front end, unfasten the door at the back, and lift out the metal plate bearing the pressure springs. Remove the

twelve sheaths, and insert a sensitive plate or film into each, as shown in Fig. 59, taking care that the dull or sensitive side is placed outwards. If films be

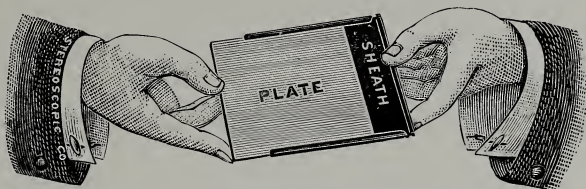


Fig. 59.—Inserting plate in sheath.

used, they must have a piece of stout card inserted behind them, so as to fill the grooves of the sheath, or, the special metal carriers made for the purpose, which are preferable.

As each sheath is filled place it in the camera, the face of the plate being turned towards the lens, as shown in Fig. 60, and the two pins or pivots in the

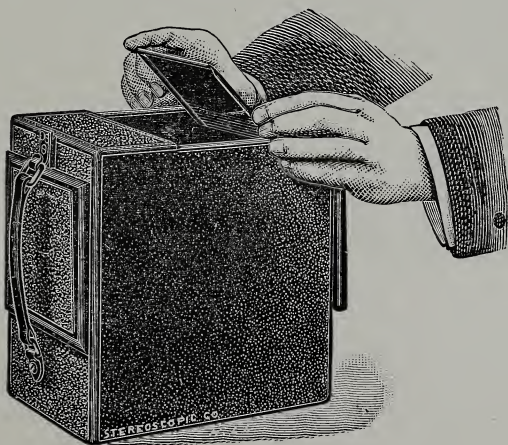


Fig. 60.—Filling the Camera with plates.

grooves provided for them, the correct position for the plates is shown at D (in Fig. 63). Replace the spring plate at the back, close and secure the back door, and the camera is ready for use.

The necessary operations incidental to the taking of each picture are:—

1. Setting the shutter.
2. Focussing.
3. Pressing the trigger.
4. Changing the plate.

And are performed as follows:—

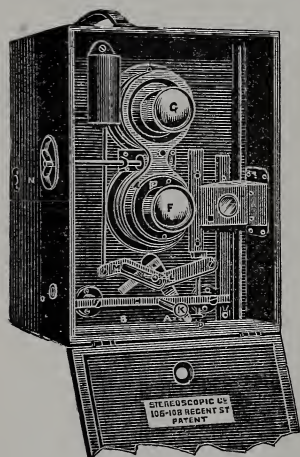


Fig. 61.

- A Lever for setting shutter.
- B Position of ditto when set.
- C Release for instantaneous exposures.
- D " " time exposures.
- E Vertical Finder.
- F Lens.
- G Focussing Lens.
- H Plate changing bar.
- K Knob for pushing ditto back into position.
- L Knob for regulating exposure.
- M Bar showing speed of shutter.
- N Focussing Handle.
- O Indicator showing number of exposures.
- P Iris diaphragm.

1. *Setting the Shutter.*—This is done by pulling the lever A (Fig. 61) from left to right; when set, the end of the lever will remain near the point marked B in the same diagram. The speed at which the shutter is to work is regulated by means of the

knob sliding along the graduated scale. *See that the knob is screwed quite firmly after each adjustment.*

2. *Focussing*.—Open the hood of the finder, and direct the lens towards the view or object to be



Fig. 62.—Focussing.

photographed, then turn the focussing handle to and fro (much in the same way as when focussing a field or opera glass) until the image appears clearly defined or sharp upon the ground glass. The picture is now ready for exposure, and this is effected by

3. *Pressing the Trigger.*—The Carlton Camera is provided with two distinct shutter releases or triggers, one being for instantaneous and the other for time exposures. That for instantaneous work is shown at C in Fig. 61, and the exposure is made by gently pressing up the end of the flat strip of metal. The

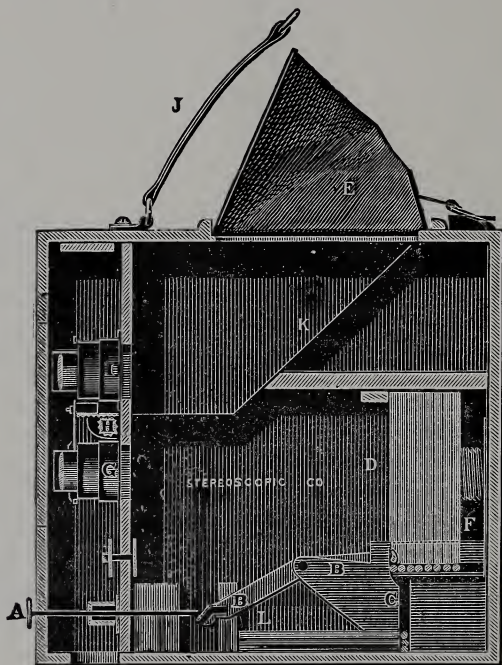


Fig. 63.—Section of Twin Lens Carlton Camera.

time exposure release is shown at D, and the exposure is made by pulling the rod down and holding it for the requisite time, the exposure terminating when the rod is released. If an exposure of more

than a few seconds is required, the rod should be pulled down and the little button at the end turned round so as to catch underneath the camera; while it is in this position the shutter will remain open, and an exposure of any duration may be given.

4. *Changing the Plate after exposure* is instantaneously effected by placing the fingers of the right hand behind the bar H (Fig. 61) and pulling it forward as far as it will come. The plate will then be heard to fall into the bottom of the camera. The bar is pushed back into its original position by means of the projecting knob K, and the next plate comes into the proper register for exposure.

*GENERAL REMARKS ON THE USE OF TWIN LENS
HAND CAMERAS.*

The camera should be held straight in front of the body, at such a height that the image in the finder can be most conveniently seen. The left foot should be slightly in advance of the body, and the camera held firmly by the front portion, the forefinger of the left hand touching the trigger. Hold your breath at the moment of exposure, and press the trigger gently and without jerking.

The diaphragm, or stops, with which the lower lens is fitted, serve the double purpose of rendering sharply objects situated at different distances from the camera, and also of improving the definition at the edges of the plate. Of course the largest aperture must be used when photographing rapidly moving objects, or for taking single portraits or small groups in a subdued light. For open air work the aperture

marked F11 will be found the most generally useful, the exposure being varied according to the brilliancy of the light and the nature of the subject.

It must be distinctly understood that no lens, however perfect its construction, will, at the same time, define near and distant objects equally well with a large aperture. The largest apertures of the lenses supplied with the Carlton and Artist Cameras should only be used for single figures, either of persons or animals, or for views in which the objects are nearly all on one plane. A smaller aperture, say F8 or F11, tends to give more perfect definition at the edges of the plate, and secures more even illumination.

Those unaccustomed to the development of instantaneous exposures should note, that a considerably longer period must be allowed for the negative to take its proper density, than is usually considered necessary when developing time exposures. Plates which have received the minimum of exposure may require developing for thirty or even forty-five minutes. Of course, in the case of such prolonged developments, the dish must be covered up with a larger dish or piece of stiff cardboard, as the extremely sensitive plates now in use will inevitably become fogged by the continued action of the ruby light. This precaution is particularly necessary when using an ordinary window covered with red glass or ruby fabric, and it is advisable to use a yellow screen in addition to the ruby.

Almost any of the recognised developing agents may be employed for developing instantaneous

exposures, Pyro-Soda being, perhaps, the most satisfactory. Hydrokinone, Amidol, Metol, and Rodinal, can each claim advantages of their own, not the least being that they do not stain the fingers or clothes like all the Pyro developers do to a greater or less extent.

THE STEREOSCOPIC TWIN LENS ARTIST CAMERA.

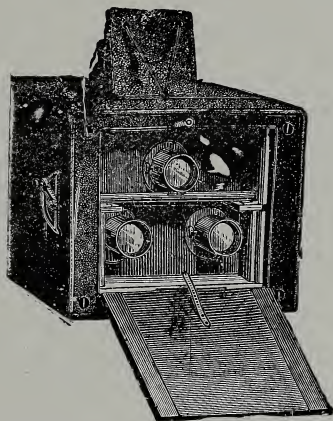


Fig. 64.—Stereoscopic Twin Lens Artist Camera.

The above may, at first sight, appear somewhat of a misnomer, for nearly all modern Stereoscopic Cameras are fitted with twin lenses placed side by side for the purpose of simultaneously securing the pair of pictures, essential to the stereoscopic effect. In the instrument illustrated above there is, in addition, a third lens, identical in focus with the pair of working lenses, thus securing the advantage of the full sized focussing finder. This is especially valuable when using so small sized a plate as one three inches square, as there is, in such a case, little

room for adjustment in case of the picture not being accurately placed upon it.

Stereoscopic photography bids fair to regain the place it once held as the most interesting and valuable branch of the art, and there is no Stereoscopic Hand Camera with so many useful and practical features as the Twin Lens Artist, nor is there one which will compare with it for solidity of construction, combined with lightness and high finish.

THE TWIN LENS AS STAND CAMERAS.

Although the cameras are primarily designed for use in the hand, they are, nevertheless, as suitable for use on a tripod stand or other support *as cameras specially made for the purpose*; and they can be screwed to any tripod stand in either a horizontal or vertical position.

When photographing architectural subjects, it is advisable to keep the back of the camera as nearly vertical as possible. In some cases a slight tilting is permissible, and, in any case when a view is much wished for, it should be taken, as, if the negatives are handed to a skilful photographer for enlargement, a considerable amount of distortion can be removed in the course of that process.

KODAKS.

During the past two years many and important improvements have been made in the well known Kodak cameras. Most of the patterns can now be adapted to use glass plates as well as continuous films. The introduction of the new Folding Kodaks has rendered it not only possible but easy to carry

an apparatus capable of making over fifty negatives seven by five inches. These cameras are fitted with the latest and most approved form of the Bausch and Lomb shutter, and are provided with rising front and swing back, so that, besides serving for hand exposures, they can be utilized for every class of photographic work (except copying). With the

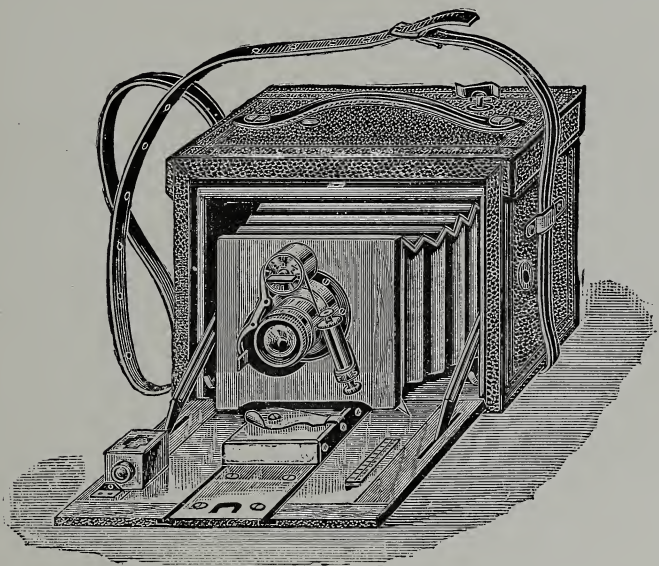


Fig. 65.—Folding Kodak Camera.

addition of a pair of lenses and a double shutter, they also answer admirably for stereoscopic work.

THE FRENA.

Those progressive photographers who pin their faith to films (which, by the way, are now made by all the leading plate makers), will find in the Frena

camera an instrument which combines a capacity for carrying a large number of exposures,—hitherto possessed only by roll-holder cameras,—with all the portability and compactness of a camera holding a dozen glass plates. In the words of the makers, the films, forty in number, are put in like “a pack of cards,” and changed after each exposure by a single

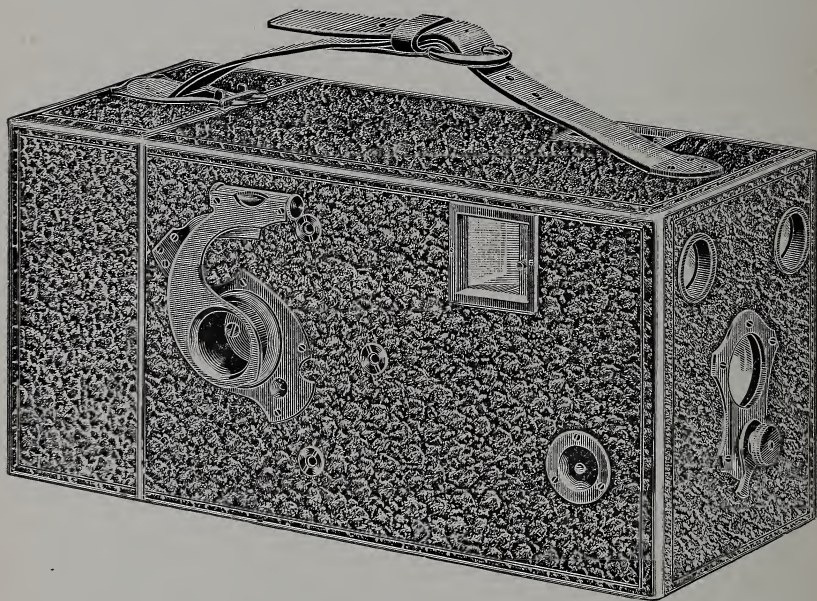


Fig. 66.—Frena Camera.

movement. Almost alone among hand cameras, the Frena is fitted with an efficient and simple swing back, so that when it is used upon a tripod, the most difficult architectural subjects may be successfully attempted. A spirit level is affixed, so that the verticality of the *film* can be instantly and certainly

attained. The lens is one of Beck's "autograph" Rectilinears, and the shutter is adjustable so as to give instantaneous exposures, varying from $\frac{1}{5}$ to $\frac{1}{80}$ of a second, while time exposure can be given at will without any special setting or adjustment. The Frena is made in two sizes, the smaller or No. 1 being the standard lantern size, $3\frac{1}{4}$ inches square, while the larger or No. 2 size gives pictures of the ordinary quarter-plate dimensions. It may be added that the price of the Frena cameras will compare favourably with any camera of similar quality.

The Frena, by the use of magnifiers, permits of near as well as distant objects being sharply rendered. It is only fair to Messrs. Beck, to acknowledge that they were the first to introduce this very convenient method of altering the focus of a lens which has a fixed position in relation to the sensitive surface.

In choosing a hand camera, there is this additional advantage in dealing with The London Stereoscopic Company, in that the purchaser can take a photograph with any camera he may select, and have the negative developed, before a definite bargain is concluded, irrespective of the much larger choice which the purchaser enjoys.

FILM PHOTOGRAPHY.

WHILE mechanics have been devoting their best efforts to the production of different contrivances, in order to make photography easy and pleasant to the worker, experimental chemists have been busy in devising new

methods of securing the photographic image. The ordinary manner of taking a picture upon a plate of glass—simple as it is—has had, and will always have, one slight drawback. Glass is a heavy material, and a brittle one; inventors have, therefore, for a long time been endeavouring to produce some substance which, while acting as a support to the gelatine film, will be of little weight, and will not be brittle like glass.

Before describing the exact method of using films in lieu of glass as a support for the photographic image, it may be as well to point out a few of their advantages. It has always been a difficulty inseparable from the prosecution of photography that the weight of glass, the principal material used, is so great. The gain in using celluloid films in this direction alone is very apparent, as sufficient material for taking one hundred pictures would only weigh a few ounces, if films be chosen, whereas, for the same number of glass plates the material would weigh many pounds. There is also another distinct advantage in using films which is worth pointing out. Every one will have noticed that in an ordinary glass negative the shadow portions of the picture which come near the high lights are blurred. This is more noticeable in the picture of an interior where there is a window or windows in the composition. These windows, instead of being clear, as they are in reality, are blurred into a black mass, which spreads itself on the adjacent shadows. This fault is known as "Halation," and is due to certain reflections from the back surface of the glass.

It is true that the difficulty can be obviated to a certain extent by coating the back of the prepared glass-plate with burnt sienna or some other compound which will destroy its reflecting surface, but such modes are at the best only makeshifts. Now, a film negative, having no such reflective surface behind it, is absolutely free from this fault of halation; and, if only for this reason alone, such negatives, for certain purposes, must always be chosen in preference to those on glass.

The convenience afforded by this invention is obvious, and one instance will suffice. Take the case of a tourist, whose steps are bent towards Switzerland, where most of the time will be spent in climbing. It would be quite out of the question to take anything but the smallest camera, under ordinary conditions, on such a tour, without occasioning the greatest distress to the traveller. But, with films, quite a large size camera—such as a whole-plate one—can be taken without any great strain upon the muscles of the arm. With camera and films,—the two only weighing two or three pounds,—the tourist is equipped for taking large pictures of some of the grandest scenes which Nature affords.

Until a short time ago, however, no really satisfactory film had been devised, that is to say, one that would combine all the advantages of glass with the addition of lightness and immunity from breakage.

Hitherto films had required the support of card or paper, and there was the troublesome and rather risky operation of stripping them from such temporary support before the negative could be used.

The introduction of celluloid films as a support for the gelatine emulsion, has, however, entirely changed the aspect of film photography, and there is but little doubt that for travelling photographers, both amateur and professional, glass negatives will soon be almost entirely superseded. Celluloid is a transparent, horn-like substance which, after being duly coloured or mixed with other suitable material, is extensively used to imitate tortoise shell, ivory, amber, and the like. The well-known waterproof collars and cuffs also owe their particular properties to the celluloid of which they are mainly composed, so that it will be seen that it is no untried material with which we have to deal. It is unnecessary to enter into the details of the manufacture of the material itself, merely mentioning that the celluloid reaches the plate maker in the form of thin sheets or leaves, rather less than $\frac{1}{100}$ of an inch in thickness, these are perfectly flat and pliable, and are quite unaltered by damp or heat. We have thus a perfectly neutral non-absorbent support for the gelatine emulsion, which is made to adhere perfectly by very finely grinding the side of the film which is to be coated (*en passant* it may be remarked that a waste film from which the emulsion has been washed, makes an admirable focussing screen, an article not easily replaced when travelling). One point in connection with the celluloid films deserves notice, for all sizes up to 10×8 no alteration of or addition to the dark slides is necessary, the film is simply laid in the rabbet of the slide, and an old negative, or better still, because it is lighter, a piece of stiff

cardboard is laid upon it to keep the spring on the metal partition from pressing the film outwards in the centre.

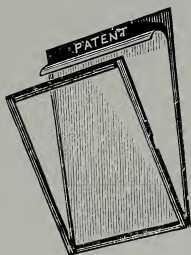


Fig. 67.—Film Carrier.

The film is, however, held with greater certainty by the new film carriers which have been introduced by the Stereoscopic Company. These consist of a blackened card, to which is hinged a light metal frame, the film is placed between the frame and backing, and the whole placed in the slide as if it were a plate. Such holders are absolutely necessary when using slides in which the plates are fastened with catches and buttons, and are desirable when using films in most forms of magazine cameras or changing boxes.

But few words are required to describe the manipulation of the film after exposure. Before development the film may be soaked in plain water for from 30 seconds to a minute. This facilitates the flow of the developer over it, and, in the opinion of some, tends to the production of more harmonious negatives. The film is then flooded with developer in the ordinary way, and, it may here be mentioned

that, although the films are capable of yielding first class negatives when the ordinary Pyro and Ammonia developer is used, they will give even finer results when Soda or Potash is the alkali employed. The favourite Hydrokinone developer gives especially brilliant pictures, and possesses two very excellent qualities, it is quite cleanly in use, neither staining the fingers nor the films, and the same solution can be used for several plates in succession ; the resulting negatives are of a fine black colour with good density and clear shadows. The foregoing remarks apply with equal truth to the new developers, such as Amidol, Metol, and Rodinal. Any of these developers may be procured ready mixed from the Stereoscopic Company, who also hold a large stock of Celluloid Films.

When using the Celluloid Films, development should be carried on longer than with an ordinary plate, or the negative will appear thin and be wanting in printing quality. If Hydrokinone or Eikonogen be used, the Alum bath will be unnecessary, and after washing off the developer, the negative may be at once transferred to the fixing bath, which should be at least an inch deep, in order that the film may be entirely covered, even if it is slightly curved, which is sometimes the case when the development has been unduly prolonged. After fixing, the film requires about the same amount of washing as an ordinary plate, and should be suspended from a line or lath to dry. If the films are allowed to dry while lying on a flat surface, patches of unequal density are almost certain to make their appearance.

If it is deemed advisable to varnish the negative, this must be done with the Company's Flexible Film Varnish, which, applied cold, is a perfect protection against damp. No other varnish is suitable, owing to the brittleness of the resins used. The Flexible Varnish may, moreover, be used for varnishing glass negatives, and, being applied with a brush, obviates many of the difficulties usually experienced by the amateur in his first attempts at using the ordinary negative varnish.

Continuous rolls of Transparent Film of excellent quality for use in Kodaks and other Roll-holder cameras, are now made by the Eastman and Blair Companies, and supplied by the Stereoscopic Company. The Blair film is rather thicker than the Eastman, and has a fine matt surface similar to ground glass. Either of these films may be developed with Hydrokinone and Pyro Soda, and are capable of yielding the highest possible quality of negatives.

ORTHOCHROMATIC PHOTOGRAPHY.

ONE of the most interesting and valuable discoveries which have been made during recent years, is that of a method of preparing photographic plates, so that they would render photographs of brightly coloured objects in a truer gradation of tone than had previously been believed

to be possible, and which, for lack of a better name, has been christened Orthochromatic or Isochromatic Photography. Although the process is seen at its best when used for the copying of oil paintings or



ORDINARY.

brightly coloured flowers, there are few subjects from which a truer gradation of tone cannot be obtained by the use of Orthochromatic plates than would be the case when the ordinary plate is used. The plate being by a special chemical treatment rendered sen-

sitive to the red and yellow rays of the spectrum, enables these colours to be translated into a monochrom, which very nearly corresponds to that which an engraver would choose as representing their true



ISOCHROMATIC.

value in black and white. The accompanying pictures of flowers, which are photo-engraved direct from the original negatives, illustrates the capabilities of the process in a remarkable manner.

With the aid of these pictures we can form some

idea of the immense power in our hands when using orthochromatic plates ; the flowers represented are : white lillies of the valley, yellow daffodils, and yellow calceolarias. In the photograph taken on an ordinary plate, the lightest points are those which in nature were the darkest, the brilliant yellow of the other flowers being represented as a black mass. In the Isochromatic picture this is all altered, and, if an absolutely true rendering is not given, at all events there is a very near approach to it, the yellow flowers being presented in all the brilliancy with which they appeared to the eye in nature. For the majority of subjects the Orthochromatic plates may be used in precisely the same way as an ordinary plate is used, and a considerable gain in truth of gradation will be apparent. For difficult subjects, such as paintings, in which red or yellow predominate, flowers, or, in fact, any subject in which bright colours, particularly blues and yellows, find place, the use of what is known as a yellow screen will be found necessary, if the full powers of plate are to be utilized. This screen consists either of a plate of pale yellow glass without blemish or unevenness, fitted either before or behind the lens, or of a film of suitably coloured gelatinous material which is fitted in a specially made diaphragm. As it is of great importance that the tint of yellow employed should be suitable, these screens should only be procured from an expert. The Stereoscopic Company have made arrangements with the holder of the English patent, to supply thoroughly reliable screens to fit their customers' own lenses. They are also special agents for the Isochromatic plates,

manufactured under Tailfer's patent, the only method acknowledged to be uniformly satisfactory.

Besides the advantages already mentioned, that of securing what are now generally known as Orthochromatic pictures, the patent Isochromatic plates place a new power in the hands of the photographer in dull weather, their sensitiveness to yellow light enabling satisfactory pictures to be made even when a considerable amount of yellow fog is present. When used for ordinary landscapes a much more pleasing representation of foliage may be obtained, while instantaneous work is rendered possible on all except the very dullest days. The fact that by the use of Isochromatic plates the Lord Mayor's Procession has been successfully photographed while actually in motion, and that good photographs of interiors may be made upon them by ordinary gas light, is abundant testimony to the usefulness of these plates for ordinary work, apart from their special quality of colour sensitiveness. The development of these plates in no way differs from that ordinarily practised, the only precaution to be observed being to use a deep *ruby light* for changing and developing, and not to expose the plate unnecessarily to even that, its great sensitiveness to the yellow and red rays rendering it very liable to fog by exposure to light. For developing Orthochromatic, or indeed any kind of plates, it is advisable to use a liberal quantity of developer, so as to make sure of covering the plate well, and to cover the developing dish with a card or metal cover, which need only be occasionally removed for a momentary inspection. Of course, the

usual rocking motion should be maintained whether the dish is covered or not.

PLATINOTYPE PRINTING.

THE best service which the chemist has rendered to photography of late years is the production of a new method of printing from the negative, by which the positive pictures obtained are as permanent as the paper upon which they rest. We all know how early photographs were apt to fade into yellowness, and although this need not be the case if the printing is executed with care, and by experienced hands, the ordinary Silver process is not to be relied upon for permanence. The new method to which we refer is called the Platinotype process; and pictures produced by it are so unalterable in their character that the strongest acid will not hurt the image, while it will destroy the paper upon which that image rests. The process is not quite so easy as the older one, but any amateur can master its details without much trouble. Particulars of working are furnished with the materials supplied for producing prints in Platinum, but the following account of the process, recently contributed to *Cassell's Technical Educator* by a well-known writer, gives a capital *resumé* of the necessary operations:—

“Ordinary photographs, by which we mean those printed in Silver, are unfortunately not always as permanent as they should be. There is more than

one reason for this, but that the failure exists must be apparent to any one who possesses pictures which are only a few years old. Many of these have probably turned to a sickly yellow tint, and are mere ghosts of what they once were. The most common source of fading is incomplete washing, for if the fixing salt is not entirely eliminated, the prints will quickly loose their early bloom. Another cause of failure is found in improper media for mounting the prints, and very often may be traced to some chemical which has been used in the preparation of the mounting card itself. Many collectors of photographs are aware of this, and obviate the difficulty by securing the pictures in their albums by the corners only. However, the risks of fading are so many that numerous experimenters have endeavoured to find some more stable compound than Chloride of Silver for printing purposes. The foremost of these methods in the present day is known as the Platinotype process, now to be described. Many workers have adopted it, not only on account of its undoubted permanence, but because of the economy of time which it presents when contrasted with the Silver method. The troublesome Hyposulphite of Soda is entirely dispensed with, and the tedious washing operation is reduced to a mere rinsing. The sensitized paper contains salts of Platinum and Iron. After being exposed under a negative for the requisite time, it is developed in a dish containing a hot solution of Oxalate of Potash. It is then immersed in a weak solution of Hydrochloric Acid, and finally in plain water. The operation is then complete.

“The insidious foe against which the platinotype worker guards at every step is damp. Not damp in the ordinary sense of the word, but the invisible vapour always present in the atmosphere even on the finest days. The paper is supplied by the manufacturers rolled up in tin cases or tubes. At the top of the tube is a perforated box containing Chloride of Calcium, a salt with such an attraction for moisture of every kind that it will quickly absorb every particle that may be present in its vicinity. The joint of the tube where it opens is further provided with an india-rubber band which covers it, and so keeps out the moisture. When the Calcium becomes damp from long use it can be dried over a fire upon a shovel, and replaced in its tube. Even when in the printing-frame, the paper must be protected from damp by interposing a piece of thin vulcanized india-rubber. The same precautions are necessary after exposure, for the paper is then quite as susceptible to moisture as it was before. After exposure, therefore, if not at once developed, it must be replaced in a Calcium tube until wanted. Should these precautions be neglected the prints will exhibit a want of vigour, general dulness of tone, dirty whites, and other disagreeable features which will probably make the beginner blame the process, when the fault really lies at his own door.

“The paper may be said to be more sensitive to light than ordinary albumenized paper, for in dull weather a picture may be fully exposed in a third of the time that a silver print would require. Before exposure it is of a lemon-yellow tint, but it changes

under light to a pale greyish brown. And here the beginner will experience some difficulty in knowing when exposure must be stopped, for it must be understood that the picture, under any circumstances, is at this stage exceedingly faint. A few experimental exposures will, however, soon put the matter right. Like all other processes in photography, the best negatives will give the best prints, but the most suitable negatives for this particular process are those which are rather intense, and possess plenty of gradation of tone. Indeed, a negative which will give rather a hard print in silver will often yield a much better result in platinum.

“For development, an iron enamelled dish is required, standing on a suitable tripod support, so that underneath it may be placed a Bunsen burner, or, where gas is not available, a spirit lamp. The developer may be made in bulk, for it does not spoil by keeping. It is made by dissolving 130 grains of Oxalate of Potash for every ounce of hot water used. To develop a print the solution is poured into the dish, and the flame is lighted underneath until the thermometer registers 170° to 180° Fahr. This is about the normal heat necessary, but under certain conditions it may be raised or lowered with advantage. Thus prints which have been over-exposed may be turned into good pictures by lowering the temperature of the developing solution, whilst those suffering from the opposite fault may be advantageously treated with a much hotter solution than the normal.

“Care must be taken in dipping the prints into the developing dish (which should contain enough

solution to give a depth of at least a quarter of an inch) to avoid bubbles. The best way of accomplishing this is to bend the paper sensitive surface downward, so that one edge touches the liquid first. The rest of the paper can then be drawn over the surface with one even movement. The paper must remain floating for about five seconds, and can then be removed. If all has been properly done, the weak, grey image has now assumed a brilliant black.

“The prints must now be cleared and washed. The clearing solution is merely Hydrochloric Acid (pure), mixed with sixty times its bulk of water. At least three dishes of this acidulated water should be placed before the operator. In the first, the prints should be placed face downwards, immediately after development, for about ten minutes. They are then removed to the second dish for a similar period, and after that to the third bath. But should this last bath exhibit the slightest trace of colour after the prints have been immersed in it, a fourth bath of the acid water must be used. Under any circumstances, this last bath should always be fresh for every batch of prints. But baths which have been used for previous batches may be used again as first baths for subsequent ones. The object of these acid baths is to remove every trace of iron from the paper, and unless every trace is so eliminated, the purity of the whites is sure to suffer in the finished pictures. If the pictures are left for more than the stated time in the acid baths—that is to say, if they are left therein for an hour or more—the image is not necessarily affected, but the paper becomes soft

and porous, and very difficult to handle. Moreover, by such prolonged manipulation, the surface may be injured by abrasion, and this must be guarded against throughout all the necessary operations. The silver-printer may be tempted to place platinum prints in plain water immediately after development, but on no account must this be done. They must be transferred direct to the first acid bath.

“The same developer will serve for quite a large number of prints, and even then it must not be looked upon as a waste product. After a batch of prints has been treated with it, it should be transferred to a bottle for another occasion. The bottle should be kept in a cupboard away from the light, for access to strong light for any lengthened period is prejudicial to the developer. Green crystals will probably form in the liquid, and it should be carefully decanted from these, fresh Oxalate of Potash being added from time to time to keep up the original bulk of solution.

“The special advantages claimed for the platino-type method of printing from photographic negatives are as follow :—

“If proper precautions are observed, as indicated in the foregoing observations, the paper will keep well in good condition for a lengthened period of time. The results are absolutely permanent. Indeed, the metallic platinum forming the image is about the most lasting substance known to chemists. It will resist the action of all chemicals with the exception of hot *Aqua Regia*, and we need hardly point out that this is a compound not likely to be brought into contact with a work of art. One special advantage

the paper has in forming a suitable basis for the work of an artist, that it is not affected by any pigment placed upon it, nor will it have any injurious action upon any colour placed above it. Artists will especially appreciate the effects produced, for a good platinum print has the appearance of a fine engraving, both in quality and colour. The non-artistic eye is so used to the warm-toned, glazed surface of an ordinary photograph in silver, that to some it may appear that the new process is cold in comparison; but the true artist will appreciate the difference, and in time, perhaps, the general public will do so too. Next, we have to consider the great gain in time possible by the platinotype process. The entire operations can be completed under favourable circumstances in about half an hour; toning and fixing being entirely dispensed with. In silver printing, the necessary washing alone is a process occupying the best part of a day, and even when all care has been taken in this respect, there still remains the question of doubtful permanence. This method of printing is not only applicable to paper. It can be adapted to different descriptions of textile fabrics, and thus it opens up a new field for photography in various departments of decorative work. To point out one illustration of its use in this direction, we may state that engineers can have their plans and diagrams printed upon linen cloth, and that such plans will bear rough usage with impunity. Photographs printed upon fabrics in this manner can be washed with soap and water without receiving any injury."

The foregoing pages describe the process generally

known as the "Hot-Bath." The inventor of Platinotype, has lately issued a modified process which he calls "Cold-Bath," and which possesses some advantages over the original method. This form of the Platinotype process is, on account of its simplicity, the one most generally employed by amateurs; the fact that the development occupies a much longer time, giving more opportunity for correcting errors in exposure, being an important point in its favour. The following special instructions are issued with the Cold-Bath paper:—

"The paper is exposed to daylight, in the printing frame, for about one-third of the time necessary for ordinary silver paper, or until it appears like a ghostly brown image upon a yellow ground.

The print is then immersed in the developer for about 30 seconds, then cleared in 3 Acid Baths containing 1 part of Hydrochloric Acid to 60 parts of water, washed for a short time in running water. The whole operation of printing, clearing, and washing being complete in about half-an-hour.

Either of the following Developers may be used:

A

Oxalate of Potash solution, normal strength,

(*i.e.*, 1 lb. Oxalate dissolved in 54 oz. water) 1 part.

Water 2 parts.

B

D solution, normal strength (*i.e.*, $\frac{1}{2}$ lb. D salts,

dissolved in 50 oz. water) 1 part.

Water 1 part.

The same precautions against damp, before, during and after printing, are as necessary with this paper as with that prepared for the Hot-Bath process."

Simple as are the manipulations in ordinary Platinotype, those in the process identified with the name of Captain Pizzighelli are even more so. The Pizzighelli paper is prepared in such a manner that the platinum image is visible during printing, which should be carried on until the picture appears sufficiently intense. After this, the print is immersed for five minutes in diluted Hydrochloric Acid (about one part of pure Acid to 70 parts of water), which is to be repeated once or twice, that is to say, until the lights appear perfectly white, a final washing of a quarter of an hour completing the process. The paper should be kept dry, but it requires a certain trace of dampness to make the picture appear directly during the act of printing. The dampness which is necessary may be absorbed either by the paper itself from the atmosphere, or it may be produced in an artificial manner. This can be done either by breathing upon the paper, or by exposing it to the steam of boiling water, or during a short time (say about half an hour) to damp air, for instance in a pasteboard box, on the lid of which moist blotting-paper is fixed; however, care must be taken not to *wet* the paper itself.

Pictures which are not sufficiently printed darken if kept in a warm moist place before treatment in the Acid Bath, or they may be made more intense by immersion in a cold 5 per cent. solution of Oxalate of Soda.

The results obtained by this process are precisely

similar both in permanence and appearance to the older Platinotype process, and the ease and simplicity with which prints may be made commend it to the attention of the artistic amateur, particularly when *en voyage*.

ARCHITECTURAL PHOTOGRAPHY.

ALTHOUGH architectural subjects are often among the first attempted by the beginner, yet it is only after he has advanced further in the practice of the art, that he finds that there are certain difficulties to be overcome and precautions observed if he is to produce photographs at all comparable with good professional work.

It is in this branch of photography that the use and abuse of the swing back comes prominently forward, and while it is too much to say that architectural subjects should not be attempted with a camera minus a swing back, the operator will in that case find himself very heavily handicapped. Presuming that the camera is fitted with a swing back, it is advisable to commence operations by adjusting the picture upon the screen with the swing back in its normal position, *i.e.*, parallel with the front, focus roughly, and see whether, still keeping the camera horizontal, the whole of the desired subject can be included on the ground glass by means of the rising front; if so, do not bring the swing back into use at all; if, however, it be found impossible, tilt the camera slightly until the whole of the view appears

on the screen, and adjust the back so that the ground glass is truly vertical. Then, using the full aperture of the lens, carefully focus the centre of the picture, and afterwards insert a small diaphragm to compensate for the throwing out of focus of the top and bottom of the plate, always remembering that the more the back is swung the smaller the diaphragm must be, in order to secure sufficient depth of focus. A small plummet or spirit level is a great help in determining when the back is truly vertical, as, if even a slight inclination be present, the resulting picture will convey the impression that it represents an example of Egyptian architecture, and not one of any of the orders which are commonly met with in Western lands. It may be taken as an axiom, that if the vertical lines of a picture converge, the back of the camera was not vertical at the time of exposure.

Although of less importance, as it can be remedied by trimming the print, it is yet advisable to see that the back of the camera is horizontal and that the vertical lines on the picture run parallel with the edges of the plate. Pictures of the class now under discussion usually nearly fill the plate, and it is annoying if the print has to be robbed of its proportions in order to square the principal object.

Any non-distorting lens may be used, although the Portable Symmetrical type is to be preferred; and if the amateur is desirous of always being able to choose the most advantageous standpoint for his camera, he should be provided with a series of say, four or six, ranging in focus from one half to twice

the length of the plate which is to be covered. These lenses are, as their name implies, exceedingly small and portable, in fact, two or three of them may easily be carried in an ordinary vest pocket. They also possess the great advantage of all fitting the same flange, so that a lens of four inches focus can be instantly replaced by one of fourteen without requiring an extra front or adapter.

When light buildings and masses of foliage find place in the same picture, then is the time to recollect Captain Abney's dictum as to exposure, and to *expose for detail in the shadows and leave the high lights to take care of themselves*. This will do much to prevent the hard and chalky appearance so common in such photographs. The quantity of Pyrogallic Acid in the developer may also be reduced by one half with advantage, when dealing with such strong contrasts as mentioned above.

Photographs of interiors require the same careful treatment with regard to the levelling of the camera and verticality of the swing back; as, however, it is often difficult, through want of light, to see the image on the screen, especial care must be taken that the back is properly adjusted. Failing a spirit level or similar contrivance, the position of the back may be tested by sighting it against one of the columns or other perpendicular lines in the building itself. Some interiors are so gloomy that it is impossible to judge of the amount of view which will be included in the negative, and, in this case, two or three lighted candles, judiciously distributed about the building, will show by the image of their

flames on the screen the exact amount included, and also the sharpness of the focussing. If even one light be carried about by an assistant, it will give the desired information. For interior work, especially when windows are included in the picture, very thickly coated plates are a desideratum; if these cannot readily be procured, the *back* of the plate should be coated with common burnt sienna mixed with a little gum water, this will almost entirely prevent the "blurring," or halation, so commonly seen around the brightly lighted parts of an interior picture. When the light is at all greenish or yellow in tone, Isochromatic plates will not only give a more harmonious picture, but will effect a considerable reduction in the time of exposure. The exposure of such pictures varies to such a great extent that it would be misleading to attempt to give any general rules. The best guide will be found in the Company's Patent Photometer, which actually measures the amount of light falling upon the screen.

Three pieces of india-rubber or cork will be found useful in covering the spikes of the tripod, which is, otherwise, very likely to slip when standing upon a tiled or polished floor.

QUICK PRINTING BY MEANS OF BROMIDE PAPER.

ALL amateurs agree in saying that the difficulties of photography, after they have learned the preliminary operations, commence when they begin to print from their negatives. Sometimes the

toning bath will, from some undiscovered cause, go wrong, and it seems to be quite impossible to persuade the red-brick-coloured print, as it comes from the printing frame, to change to that purple tone which is so much admired. For this reason any process which will do away with the necessity of toning, and which will at once afford pictures of a pleasing colour, is a desideratum that few will despise. By the aid of gelatino-bromide paper these difficulties are at once obviated. This paper has all the qualities of a gelatine plate, except that the emulsion is spread upon a flexible support instead of upon glass. It is also generally made somewhat slower in action, and this gives us a distinct advantage in using it. At the same time it is quick enough to give a print when exposed under a negative in the printing frame to gaslight, or to paraffin or candlelight, if gas be not at hand. It is supplied in the ordinary photographic sizes, and it is also made in three different forms, so that we can produce a picture upon a smooth, thin paper, or upon a medium paper, with a certain amount of grain, or upon a rough surface paper, like that used for water-colour drawings. This latter presents a great advantage, for the surface is of such a nature that it can be worked upon in water-colours, oil-colours, or crayons. The picture can, therefore, be finished in any way desired. It is advisable not to attempt to use daylight for this kind of printing, unless the negative should happen to be of extraordinary density. Gaslight will be generally found sufficient for all needs. A paraffin lamp gives a somewhat whiter flame, and the exposure

made by that means is rendered somewhat shorter ; but in any case it is only a matter of seconds, and so there is no great advantage in using paraffin over gas. In this kind of printing it is better to over-expose rather than to under-expose, for the rule holds good here as it does in the production of a negative, that over-exposure can be remedied by after treatment ; but an under-exposed picture is generally good for nothing.

Before attempting to apply the developer, the paper must be made thoroughly limp by soaking in cold water, and the same precautions must be adopted that were found necessary in the development of paper negatives,—in removing air-bubbles by means of a camel's hair brush. The paper should be carefully soaked, and not merely wetted, for to obtain the best result we have not only to moisten the gelatine surface, but to render the paper upon which it is placed perfectly wet. Another precaution that it is necessary to adopt is to change the water used for soaking, between every two or three pieces of paper developed. Indeed, it is best to soak every piece in fresh water. The development is nearly always brought about by the Ferrous Oxalate formula or one of the non-staining developers, as Amidol, Metol, or Hydrokinone, and seldom by Pyro. The Oxalate solution is always rendered distinctly acid, but it is not necessary to give exact details in this place, as these are given with each packet of paper purchased, and it is always best to implicitly follow the directions which are supplied by the maker. The now popular Hydrokinone developer also appears to answer well

with most makes of the bromide paper. It should, however, be slightly weaker than when used for developing negatives.

As in the case of glass negatives developed with this formula, more than one piece of paper can be developed in the same bath; but we do not recommend that course. The expense is not great, and we may as well afford a fresh developer for each print; indeed, it is necessary to do so if we wish to ensure the best results. We can, with advantage, mix part of the developer last used with that freshly made up for the next print, so that after one piece of paper is developed, instead of throwing the spent developer down the sink, we can pour it, or, at any rate, part of it, into the developing cup to mix with the next batch made.

After development, the paper print is not washed, the developer is poured off, and an acid solution is at once poured on to the paper. This precaution prevents the whites of the picture turning yellow, as they would be apt to do without it, from the deposition of the iron salt in the pores of the paper, acid at once checking this tendency.

After allowing the acid solution to act for a minute or two, the paper, still lying in the dish, must be *thoroughly* washed under the tap, and this must be continued until the slight milkiess at first discernible completely disappears, and the water runs off clear. (The acid bath is not necessary when the Hydrokinone developer is used, the developed print being well rinsed and at once returned to the fixing bath). Next comes the fixing operation; and here,

again, we have recourse to Hyposulphite of Soda, and use a solution, *which must be freshly made*, containing 5 oz. of that salt to a pint of water. The fixing operation should be continued for at least fifteen minutes, for upon this thorough fixing depends, in a great measure, the permanence of the prints. The Hypo. bath should not be used for fixing more than about half a dozen prints, and directly it shows signs of becoming discoloured, it should be at once rejected, and a fresh bath mixed. This salt is so exceedingly cheap, that the expense of such a proceeding is not worth consideration. The washing which follows fixing must be most thorough; and let it be remembered that to secure this thorough washing, changes of water should be frequent at first, after which the print can be allowed to remain soaking for some time in a deep vessel of water, and should be changed at intervals. The prints can afterwards be hung up by clips to drain, and allowed to dry spontaneously. We may take off a little of the surplus water from the back of the paper by means of blotting-paper; but the prints should not be blotted on the film side.

Pictures produced by this process may be looked upon as being permanent. A discussion has lately arisen concerning this matter of permanency; and while some claim that the picture will be as permanent as the paper upon which it rests, others affirm that, like all Silver compounds, the image must be looked upon as an unstable one. This question can, of course, only be settled by lapse of time; but we are in a position to say that we have

seen prints produced by this method over ten years ago, which certainly show, as yet, no sign of fading.

These gelatino-bromide prints have all the appearance of platinotypes. At a recent technical meeting of one of the photographic societies, several prints produced by both these methods were handed round the room for the inspection of those present, and experts were quite unable to point out which prints were produced by the Bromide process, and which were due to Platinum. At recent exhibitions, too, where examples by both these methods have been shown in plenty, it has been quite impossible to tell the one from the other. The main advantage in this method of printing lies in the fact that copies can be produced by artificial light, and, therefore, quite independently of the fickle light of the sun. The necessary exposure in the case of a normal negative is about ten seconds, if the printing-frame be held at a distance of one foot from an ordinary bat's-wing gas-burner. One of the Company's Self-lighting gas burners will be found a desirable adjunct to the dark room, as they enable the changes from darkness to light, or *vice versâ*, to be made instantaneously, and without using matches.

Another description of printing surface has been introduced of late years, and the pictures produced by the method about to be described are full of softness and delicacy. The process is known as printing on opal. Opal glass, resembling in appearance translucent porcelain, is prepared by being coated with gelatino-bromide emulsion; in fact, the preparation is just the same as the paper just described,

as is also the method of development. The opal plate is exposed beneath a negative in a printing frame to artificial light, and is developed in the same manner as a paper print. Full details of the operations required are supplied with these opal plates. They are particularly suitable for portraits, and, when elegantly framed in plush, they form very pleasing ornaments for the walls of a drawing room, and, if tinted, rival in beauty the ivory miniatures which used to be so fashionable in olden times.

CARBON PRINTING.

THERE is one other printing process which, although it is now some years old, is so effective in its results that it must not be passed over in silence. This is the Carbon process. It depends for its efficiency upon the curious property conferred upon gelatine which has been charged with one of the dichromates of the alkalies, of which the salt commonly known as Bichromate of Potash is a good example, in becoming quite insoluble after being exposed to light. Gelatine so treated and mixed with a certain quantity of carbon, or other form of pigment, is exposed beneath a negative, and those portions which are affected by light become insoluble, whilst the remainder of the surface, which is supported on paper and is known as "tissue," retains its solubility. The developing medium is hot water, which quickly dissolves away all those portions of the tissue which have been unaffected by the light.

It is almost impossible to give a description of the process, and those who wish to adopt this beautiful method of printing are recommended to have a lesson, which can be arranged for with the manager of the Company.

The results are both permanent and beautiful, and, were it not that platinum and bromide paper put both these desiderata at the disposal of the amateur, it might be desirable to consider it more in detail. A very beautiful modification of the Carbon method is that known as the Woodbury-type process, by which prints, with all the beauty of silver-printed pictures, can be produced by the hundred or the thousand for purposes of publication. These prints, being in Carbon, are absolutely permanent. The Company are prepared to give estimates for Woodbury-type pictures of any size, but they wish it to be distinctly understood that the process is only used when a considerable number of copies are required. In that case it is a cheap process, but for a small number of prints it is unsuitable, because the initial expense is in the preparation of the necessary mould.

STEREOSCOPIC PHOTOGRAPHY.

AFTER suffering years of neglect, it is in the highest degree satisfactory to note that the Stereoscope is in a fair way to resume its old position in public favour. Thanks to the increased facilities afforded by dry plates and modern

apparatus, no one need now be dependent on purchased slides for this charming instrument, for, with a very slight outlay, anyone possessing a camera of half-plate size, or larger, can equip himself for making these most interesting of all photographic productions.

It would be out of place here to attempt a long disquisition on the theory of binocular vision, but it is necessary to explain that each of our two eyes sees a slightly different view of any object or objects to which they may be directed, and that the mental coalescence of these two *very slightly* dissimilar impressions conveys to the mind the idea of the solidity of the object in question. On looking at a drawing, or an ordinary view, we at once feel that this impression is absent, and we have to judge of the relative positions of the objects depicted by their respective sizes, and by the amount of aërial perspective present. If, however, instead of taking one photograph of our subject we take two, separating the lenses by a few inches (say three), we shall find that there is a slight difference in the relative positions of all the details, and, on placing the two prints in the Stereoscope they will be found to apparently unite into one picture, which "stands out" with all the solidity of the original.

It is therefore premised, that to produce a stereoscopic slide we must be provided with an apparatus with which we can take, either simultaneously or successively, two pictures from points a few inches removed from each other. Although this may be accomplished by using one lens mounted on a sliding

front capable of considerable lateral movement, so that the right-hand picture may first be taken, and then the lens moved to the other side of the camera to take the left-hand one; yet the plan of using an exactly-matched pair of lenses, and taking the two pictures simultaneously, presents so many advantages that the older plan may be practically left out of the question. Given, then, a camera of half-plate size, or slightly larger ($7\frac{1}{2}$ in. \times 5in. is very convenient), it should be divided down the centre by a collapsible partition, which the camera maker will readily supply. An additional rising front must then be provided, and upon this should be mounted an exactly-matched pair of lenses, their centres being from $2\frac{3}{4}$ inches to $3\frac{1}{4}$ inches apart. It may here be mentioned that although rectilinear lenses are most efficient, yet single landscape lenses, such as the Black Band Conical Mount lens, will yield pictures of the highest excellence, the slight distortion produced by the lens being removed by the contrary distortion caused by the eyepiece of the stereoscope. A Stereoscopic Hand Camera is described on page 143.

The manipulation necessary for the production of the negative calls for no special remark, and it is only when we reach the printing process that any deviation from the ordinary method is found to be necessary. Taking the simplest form of stereoscopic picture, one on albumenized paper, it will be found necessary, after printing it in the ordinary way, to cut the two pictures asunder and to transpose them in mounting. If this is not done, what is called a pseudoscopic effect will be produced; that is to say,

that the more distant objects will appear in the stereoscope to be in front of the foreground objects. When it is desired to produce the slides as glass transparencies, which cannot, of course, be cut and transposed, a special form of printing frame (which may be procured of the Stereoscopic Company) is necessary, unless the transparency be made from the negative by copying in the camera with a pair of lenses in the same way that the negative itself was taken. The transparency should be backed with a finely-ground piece of glass and bound in the same way as recommended in the chapter on Lantern Slides.

The beginner is strongly recommended to procure a few first-class stereoscopic slides, either on glass or paper, according to the style he wishes to produce. These will serve as a guide for mounting, &c., and form a standard by which the novice may judge his own productions. A large selection of stereoscopes and slides may be seen at the Stereoscopic Company's establishments, and it is to be hoped that once more the marvellous invention of Brewster will come into favour, and that there will then be

NO HOME WITHOUT A STEREOSCOPE.

PHOTOGRAPHY BY ARTIFICIAL LIGHT.

EVER since the invention of the art, photographers have been endeavouring, with more or less success, to find some substitute for daylight. The electric light has most nearly filled

the required conditions, and portraits of the highest excellence are now taken by its aid. It is, however, denied to the majority of amateurs to have an arc light of several thousand candle power at their disposal, and it is fortunate that an efficient substitute has been found in the metal magnesium.

It is about a quarter of a century since magnesium was pressed into the service of photography, and, even with the slow plates then in vogue, fairly satisfactory portraits were taken by the light of this metal burning in the form of a ribbon or wire.

With the advent of dry plates, magnesium light photography received a great impulse, improved methods of, and appliances for burning the wire and diffusing the light following each other in rapid succession, culminating in what is now known as the "flash light," in which the magnesium is burned in the form of powder, the exposure of the picture being only a fraction of a second in duration.

The flash lamp, as illustrated below, while being perfectly efficient in action, possesses the other very desirable qualities of being simple, portable, and inexpensive. Occupying only a few inches of space, it is readily packed up with the camera and slides, and the amateur is enabled to make the camera his companion at the ball, the card party, or the after-dinner chat. The *modus operandi* is simple, and there is no danger attending the use of the lamp. The large square body of the lamp must first be filled with methylated spirits, and a charge of magnesium, say 8 to 12 grains, inserted in the brass funnel. The sitter may now be posed and the picture

focussed, and when all is ready the spirit lamp is lighted. The cap of the lens should now be removed, and the exposure made by smartly pressing the rubber bulb. The ordinary illumination of the room will serve for arranging and focussing the picture, and need not be in any way modified during the exposure. A few directions as to the position of the lamp during exposure are necessary. If a portrait with the light falling upon the sitter in the

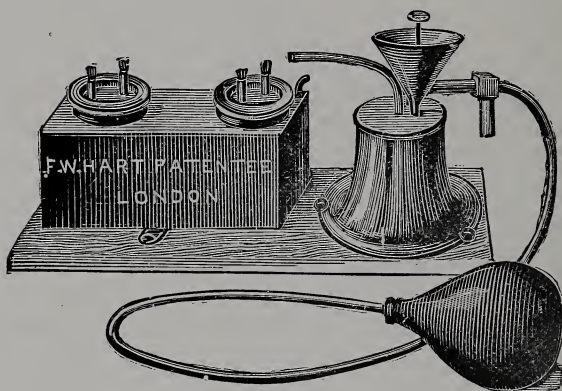


Fig. 70.—The “Flash Lamp.”

ordinary style is desired, the operator should stand a foot or so to one side of the camera, and as nearly as possible in a line with it. The lamp should be held as high as the operator's stature will allow, a chair or footstool being utilized to raise the source of light, if necessary. The greatest care must be observed in keeping the flash itself out of the field of the lens, or fogged pictures will inevitably result. It should also be remembered that a mirror included

in the picture will often produce the same effect as the flash itself would have done. A reflector should be provided on the shadow side to light up the otherwise deep shadows, which must appear when the whole of the light is coming from a comparatively small point. The most harmonious results may be obtained by firing the flash behind a translucent screen, such as ground glass or tracing paper; in this case, however, at least two lamps, capable of being discharged by the same ball, must be used, as a considerable amount of light is arrested by the diffusing medium.

If it be unnecessary to take quite rapid pictures of groups or single figures at night, much finer results may be obtained by using the Nadar Flash Lamp, which gives a continuous flame, and allows an exposure of several seconds to be given. The pneumatic attachment is fitted with a tap, which may be turned on after inflating the flexible reservoir, and turned off when an adequate exposure has been given.

With one of these lamps, it is quite easy to photograph 30 to 40 persons at dinner, or seated about the room, while two lamps will give sufficient illumination to photograph a scene on any fair sized stage.

The development of flash light pictures in no way differs from the methods practised in ordinary portraiture, excessive density being carefully avoided, as this will give a chalky appearance to the picture. Leaving all the other ingredients in the developer in their usual proportions, the Pyro may, in the

majority of cases, be reduced to one-half with advantage, thus enabling the details to fully develop before the high lights have obtained their full strength.

Besides its application to portraiture, almost every worker will find some special use for this new method of lighting. The interiors of ordinary rooms can be photographed by a judicious mingling of artificial and day light, using the latter to give the natural effect of light and shade as heretofore, and supplementing it by one or two flashes to give detail in places which would otherwise show as black patches. Even at night, interiors can be very satisfactorily photographed by aid of the magnesium flash, numerous pictures of Egyptian tombs having been so taken at a depth of many feet below the surface of the earth.

Although not absolutely necessary, a Portrait Lens is a very desirable addition to the flash light outfit, as, owing to its superior rapidity (four times that of the Rapid Rectilinear), it minimizes the chance of under-exposure.

It may be well to warn the beginner against the use of explosive compounds sold for the purposes of flash light photography. If nothing but pure magnesium powder be used, absolute safety is thereby ensured. In America, particularly, compounds of Chlorate or Nitrate of Potash and Magnesium are largely used, and it is necessary to point out that these should only be used by experienced workers, who are aware of the risk of using them and are accordingly cautious.

The older forms of magnesium lamp, in which the metal is burned in the form of ribbon may still be found useful, where there is little chance of the subject moving; they possess the advantage of requiring no spirit or other fuel, the magnesium burning alone. Some of the forms are very portable, one in particular being small enough to go in the vest pocket, and yet containing enough ribbon for a dozen or more ordinary portraits.

The Stereoscopic Company make a speciality of appliances for artificial light photography, and their "Evening Set" has been one of the successes of the past season. They have published a *brochure* "Evening Photography," giving brief but explicit directions, accompanied with diagrams for this latest and most interesting development of the art.

HOW TO TAKE PORTRAITS AT HOME BY THE ELECTRIC LIGHT.

THE greatly extended use of Electricity for lighting private residences, has induced the Stereoscopic Company to introduce an apparatus, by means of which amateurs can secure photographs at home, which shall in every sense equal the finest productions of their own Electric Light Studios.

It is impossible to over-estimate the advantage of the system briefly described below, and very many

will appreciate the possibility of being able to take portraits of ladies in evening dress, and so obviate the necessity of troubling them to re-dress at midday for the purpose of being photographed.

Formerly the approach of winter meant the abandonment of the camera, whereas now it can be used all the year round, irrespective of weather; and the electric lamp, with its simple accessories, will now be regarded as necessary adjuncts to the usual

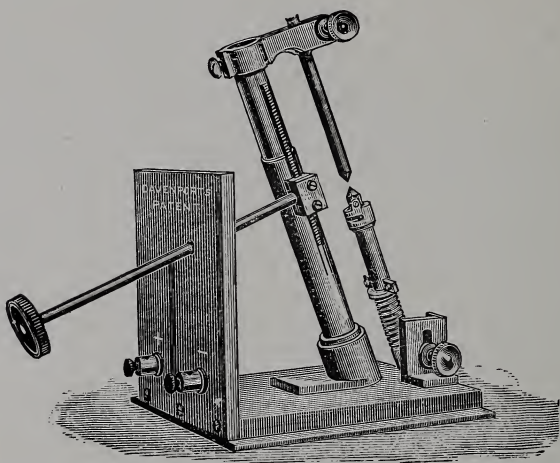


Fig. 71.—Electric Lamp.

photographic outfit. The properties required in an illuminant for photography are brilliancy and whiteness of the light, freedom from fluctuation, steadiness of the apparatus, and ease of adjustment;—all these demands are met in a most satisfactory manner by the simple lamp shown in fig. 71.

It will be seen that there are two carbon holders, so arranged that, while the lower carbon is automatically maintained (by a spring) in the proper position for burning, the upper one is fed forward by hand from time to time as needed. This is done by means of a rod at the back of the lamp, attached to a rack and pinion arrangement. The tube containing the lower carbon is fastened by a thumbscrew to a fixed upright plate, having a slot cut in it so that the height of the tube may be varied and other adjustments made. The two carbons are set at an angle, so that the full benefit of the arc is obtained directly in front, the advantage of which is obvious.

The lamp will burn continuously for about two hours, and fresh carbons can be inserted in a few moments. The systems of electricity known as "direct" (continuous), "alternating," or "stored" can be used, and the simple necessary "boss" or fittings can be adjusted easily by the local electrician at a small expense.

All metal rods and fittings are carefully insulated and protected from the possibility of short circuit, or risk of shock to the operator, and the whole apparatus is well made and carefully tested before delivery.

The fullest directions are given with the lamp, or a practical demonstration can be had at the time of purchase. To obtain a portrait by means of the electric light, it is necessary it should be diffused, hence a reflector is required. After careful experiments, the Company have devised a simple form

by means of which a good result is obtainable in about 8 seconds. Although the description appears somewhat elaborate, the whole apparatus is exceedingly simple, and a visit to the studios of the Company (where the appliances are shown), will confirm this.

The lamp described is useful also for the magic lantern, and the extreme nervousness, caused by recent mishaps with oxy-hydrogen gas, is sure to make the use of electricity more general. It may be mentioned, also, that the light obtained by the arc lamp is more powerful and easier to work, thereby making the optical lantern more accessible to those who object to gas or oil.

SELECTED DEVELOPING FORMULÆ.

PYRO AND AMMONIA DEVELOPER.

No. 1.—Liquor Ammonia, '880	...	...	...	1½ ounces.
Bromide of Potassium	...	...	...	8 drachms.
Water	...	...	...	6½ ounces.
No. 2.—Pyrogallic Acid	...	...	...	1 ounce.
Citric Acid...	...	...	...	2 drachms.
Water	...	...	...	8 ounces.
Take 1 ounce No. 1 and 15 ounces water, label A.				
Take 1 ounce No. 2 and 15 ounces water, label B.				

To develop a plate having had a normal exposure, use equal parts A and B.

PYRO AND SODA DEVELOPER.

No. 1.—Pyrogallic Acid	...	...	...	...	1 ounce.
Sulphite of Soda	...	...	...	...	6 ounces.
Water	...	...	...	...	16 „
No. 2.—Crystallized Carbonate of Soda	...	...	...	...	4 ounces.
Water	...	...	...	...	16 „

To develop, take one part each of 1 and 2, and six to ten parts of water, according to exposure or season.

HYDROKINONE DEVELOPER.

A.—Hydrokinone	...	...	...	...	80 grains.
Sulphite of Soda	...	...	...	...	80 „
Bromide of Potassium	...	...	...	...	10 „
Citric Acid	...	...	...	...	10 „
Water	...	...	...	...	20 ounces.
B.—Caustic Potash	...	...	...	...	160 grains.
Sulphite of Soda	...	...	...	...	160 „
Water	...	...	...	...	20 ounces.

To develop, take equal parts of A and B.

EIKONOGEN DEVELOPER.

A.—Eikonogen	...	...	...	...	2 drachms.
Sulphite of Soda	...	...	...	...	8 „
Water	...	...	...	...	15 ounces.
B.—Crystallized Carbonate of Soda	...	...	...	...	4 drachms.
Water	...	...	...	...	10 ounces.

To develop, take three parts of A and one part of B.

N.B.—A few drops of a 10 per cent. solution of Bromide of Potassium may be used as a restrainer with any of the above developers.

THE END.

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PRINTING FROM AMATEURS' NEGATIVES

The Company's Printing Establishment and Works at New Southgate, about 12 miles north of London, are amongst the most extensive in the world. The perfection their Staff have attained, in the production of thousands of photographs daily, is due to the excellent organization and experience brought to bear upon the processes. This the Company have pleasure in placing at the disposal of Amateurs desiring *prints* from their Negatives. The most brilliant results are insured by the work being entrusted to the *Experienced Artists employed*.

All Orders executed with the utmost promptitude.

The Best Printers only are employed.

All Amateurs' Negatives are Spotted Free of Charge, thus giving the prints a clear appearance that is only obtainable from properly-finished Negatives.

Re-touching. Portrait Negatives can be Re-touched by the Company's Artists, making the results equal in every respect to the productions of professional Photographers who have spent many years in the business. The charge for Re-touching is regulated by the size of the figure to be re-touched, and the condition of the negative, but is extremely moderate in any case.

Mounting Amateurs' Prints is a department that requires great taste, and the Company feel sure they can please even the most fastidious by the great care exercised in selecting only such Mounts as are peculiarly suitable for the subject in question. Prices according to quality of mount.

Framing. Many Amateurs are greatly disappointed upon seeing their artistic pictures utterly spoiled by the want of taste displayed by the framer ; but this will not be the case with orders entrusted to the London Stereoscopic Company ; they always having a very large number of patterns in stock, which can be seen at any time. Quotations given according to the style required.

Albums are carefully prepared, dated and named, with Photographs mounted in them as desired by the customer. A large selection of Scrap and other Albums always in stock.

Enlargements are made from Amateurs' Negatives at reasonable rates, in Carbon, Silver, or on the new Gelatino-Bromide Paper.

Transparencies for Window Decoration, giving very beautiful effects, can be prepared from any Negative, in sizes from $\frac{1}{4}$ -plate up to 10 feet.

Magic Lantern Transparencies, illustrating tours, &c., by the Amateur, can be executed from his own Negatives. Prices : uncoloured, 2s. 6d. each ; coloured by hand by special artists, 5s. each.

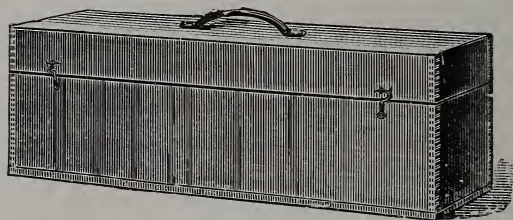
DEVELOPING DEPARTMENT.

The Development of Amateurs' Negatives is personally conducted by the high-class Operators and Demonstrators attached to the Amateur Instruction Department. Customers may rely on the best possible results being obtained from all Negatives entrusted to the Company for Development.

The Stereoscopic Company's

TWO GUINEA

SET,



Containing Camera, Lens, Double Dark Slide, Tripod Stand, Baths, Dishes, Dry Plates, Dark Room Lamp, Printing Paper, Printing Frames, and Book of Full Directions.

Sent, Carriage Free, to any Railway Station in England

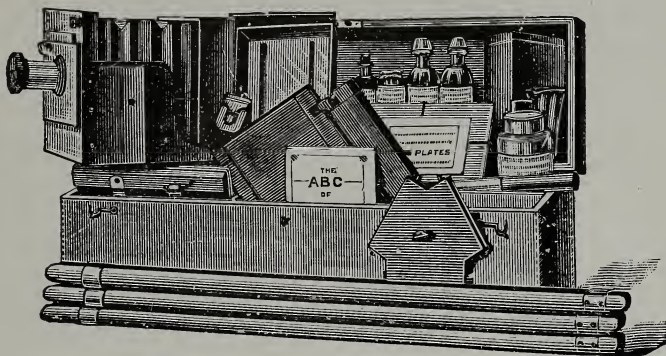
FOR

£2 4 0

The Stereoscopic Company's

“£5 5 0”

Photographic Outfit



Sent Carriage Free for £5 8 0.

The Set consists of one of the Company's best $\frac{1}{4}$ -plate Cameras, specially made and designed, and which will be found to have every convenience for working. The Lens is a Rapid Rectilinear, suitable for taking Portraits, Landscapes, Groups, Architectural subjects, and Instantaneous Studies.

The Laboratory Outfit contains :—

Dry Plates	Ebonite Dishes	Toning Solution
Hyposulphite of Soda	Printing Frame	Dark Room Lamp
Developers (two bottles)	Graduated Measure	Printing Paper

And the Company's "A B C of Modern Dry Plate Photography."

The whole of the above packed in Polished Stained Mahogany Box, with Lock, Key, and Handle for carrying. The Tripod Stand is portable, and, folding into a small compass, will be found most convenient for travelling or home use.



FREE LESSONS

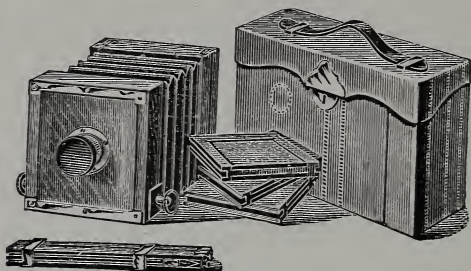


ARE GIVEN WITH THE ABOVE AND FOLLOWING OUTFITS.

THE

“LADY CYCLIST’S”

SET,



Specially constructed for carrying on a

SAFETY BICYCLE.

The

“LADY CYCLIST’S”

SET

CONTAINS

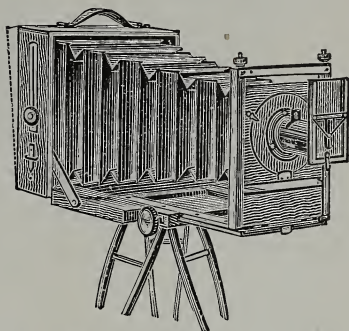
A Quarter Plate Camera made of the best Mahogany, with Rack Focussing, three Double Dark Slides, and a “Black Band” Rapid Rectilinear Lens. All packed in solid Leather Case, with Lock, Key and Handle, and is supplied with a Special Cycle Carrier instead of the usual Tripod Stand.

IT IS NEAT, SMALL, LIGHT AND PORTABLE.

PRICE £6 6 0.

THE STEREOSCOPIC COMPANY'S

"COLLEGE"



SET.

FOR TAKING PICTURES $6\frac{1}{2} \times 4\frac{3}{4}$ INCHES.

Comprising one of the Company's best $\frac{1}{2}$ -plate Cameras, with Vertical and Horizontal Fronts, Patent Rack and Pinion for Focussing, with two Double Dark Slides (to hold two plates each) and First-class Rapid Rectilinear Lens, suitable for taking Portraits, Landscapes, Groups, and Architectural Subjects on plates $6\frac{1}{2} \times 4\frac{3}{4}$ inches.

Price £10 10s.

Packed and sent Carriage Free to any Railway Station in England for £10 15s.

The Tripod Stand is most portable, and, folding into a small compass, will be found very convenient for travelling or home use.

*** THE LABORATORY OUTFIT, ***

CONSISTS OF

Dry Plates
Developers (two bottles)
Dark Room Lamp
Printing Frame
Graduated Measure

Acetate of Soda
Chloride of Gold
Ebonite Dishes
Hyposulphite of Soda
Printing Paper

And the Company's "A B C of Modern Dry Plate Photography."

The whole of the above is packed in Polished Mahogany Stained Box, with Lock, Key and Handle for carrying.



FREE Lessons to Purchasers.



A Really High Class CAMERA

IS THE
STEREOSCOPIC
COMPANY'S

PATENT.

The Company's Patent Camera is a really up-to-date instrument, and has every movement that a good instrument should possess, and it is so well (though lightly) made that it will withstand the extremes of hot and damp climates.

The Outfit consists of the Camera, with three Double Dark Slides, best "Black Band" Rapid Rectilinear Lens, solid leather velvet lined Case, with Lock, Key and Handle, also Focussing Cloth, and a strong but light and rigid Tripod Stand, together with a **full** Laboratory Outfit.

Testimonial.

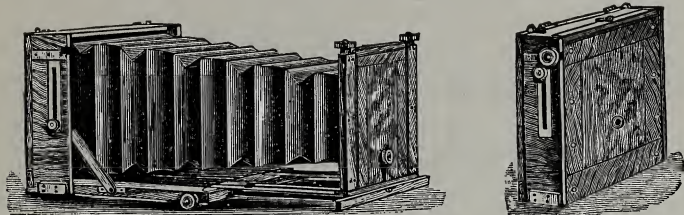
*"Cape of Good Hope Bank, Ltd.
Tarkastad, S. Africa.*

"GENTLEMEN,—You may, no doubt, remember that I was the purchaser of one of the Company's half-plate sets about three months ago; and I have much pleasure in informing you that the Camera works most excellently, and I am able to state that everything connected with the set is of really good stuff, and well worth the money paid for it.

"Yours faithfully,

"BASIL CHRISTIAN."

FOR PRICES SEE OPPOSITE PAGE.



PRICES OF THE COMPANY'S

PATENT OUTFITS

Containing everything necessary to take and finish a large quantity of Photographs.

TO TAKE PICTURES,	$6\frac{1}{2} \times 4\frac{3}{4}$	(half-plate)	-	£19 19 0
„ „ „	$7\frac{1}{2} \times 5$	($\frac{3}{4}$ -plate)	-	25 0 0
„ „ „	$8\frac{1}{2} \times 6\frac{1}{2}$	(whole-plate)	-	35 0 0

These Outfits are Absolutely Complete.

— (PLEASE READ !) —

“Bryn-y-Nenadd, Llanfairfechan, N. Wales.

“GENTLEMEN,—I have much pleasure in stating that all the apparatus recently supplied by you gives me the greatest satisfaction. I was also much gratified with the course of lessons you gave me, as I had no idea that a knowledge of the Art could be so easily attained, and my only regret now is that I did not learn sooner, for, in that case, I might have brought back a series of views from past yachting cruises, &c.

“I am, Gentlemen, yours faithfully,

“SYDNEY PLATT.

“To the London Stereoscopic Company.”

FREE Lessons are given to Purchasers.

THE **SPORTSMAN'S** **CAMERA** } **IS THE** **Stereoscopic Company's** **BINOCULAR.**

(By Royal Letters Patent.)

*The "Binocular" Camera, when loaded with 12 Plates or 30 Films,
weighs 19 ounces only.*

Your attention is respectfully directed to the following **SPECIAL ADVANTAGES** possessed by The "Binocular" Camera :—

Its simplicity obviates the necessity for any knowledge of Photography.

It gives correct elevation and exact perspective.

It takes 12 Glass Plates or Flexible Films, or can be had to take 30 Films only.

It takes 18 Glass Plates or Films in the larger size.

The number of Plates exposed can be seen at a glance.

Single exposures can be taken out and developed, independently of the bulk.

In conjunction with the Special Enlarging Apparatus, the "Binocular" Camera is practically equivalent to an ordinary Camera carrying 12 Plates or 30 Films 7 x 5 inches, or 18 Plates 8½ x 6½ in the No. 2 "Binocular."

The Finder shows the picture without Reversal, and in any light.

It is fitted with a Safety Shutter, so that no light can reach the Plate except at moment of exposure.

The Shutter can be set for either time or instantaneous exposures.

The Camera can be emptied and refilled in a few minutes.



The Binocular Camera as used.

Glencorse House,
Milton Bridge, Midlothian,
May 22, 1895.

Dear Sirs,

I thoroughly tried the Binocular Camera yesterday, in a poor light, and am much pleased with it.

I have at various times bought five or six other hand cameras, and the Binocular is the only one with which I have succeeded in making a photograph to my liking. Having had twenty-three years' experience as an amateur I am not easily satisfied.

Yours faithfully,
J. COCKBURN, F.R.S. Edin., F.R.A.S.

PRICES OF THE Binocular Cameras.

No. 1	To carry 12 Plates, $2\frac{5}{16} \times 1\frac{3}{4}$	- - -	£5 5 0
No. 1	Ditto to carry 30 Films	- - -	£5 5 0
No. 1	To carry 12 Plates with special Zeiss Lens and improved and controllable Shutter	- - -	£12 12 0
No. 2	To carry 18 Plates, $3\frac{1}{2} \times 2\frac{1}{2}$	- - -	£10 10 0
No. 2	Ditto with Zeiss Lens	- - -	£17 17 0

—: TESTIMONIALS. :—

St. Mary's College, Bruges, Belgium,

Sept. 23, 1895.

GENTLEMEN,—I am happy to say that I find the Binocular Camera of the greatest possible use. I use it almost entirely for collecting notes of costumes, foregrounds, details of architecture, incidents of ordinary life. such as groupings in the streets, examining luggage at the Customs, and all sorts of things of that character. For an Illustrator, or anyone requiring data of that description, I think the Camera is the very best I have ever seen, as the results are so clear that, in spite of the small size, there is no occasion to have them enlarged in order to work from them. The extreme simplicity and portability of the Camera, makes it no trouble to carry about or use, which is a point of considerable value to Artists.

Yours faithfully,

HENRY G. MASSEY,

Associate Royal Society Painter Etchers, and Society of Illustrators.

Esplanade Family Hotel, Minehead,

Oct. 10, 1895.

To the London Stereoscopic Company.

GENTLEMEN,—I am very pleased with my Camera and have obtained some charming pictures during my stay in Homburg, and also while travelling through Devon and Somerset. I can discover no drawbacks at all to the Camera.

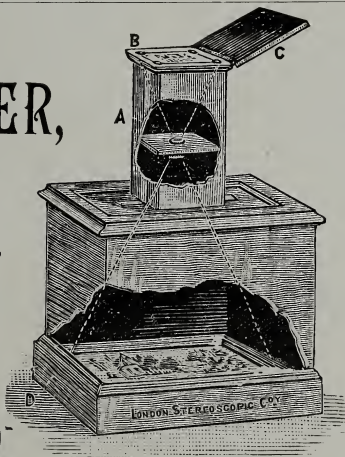
Yours faithfully,

MARIE CORELLI.

PRICE OF THE ENLARGER,

to Enlarge
from No. 1 to
 7×5 inches,
and
No. 2 to
 $8\frac{1}{2} \times 6\frac{1}{2}$ in.,
is

£5 5 0



THE
BINOCULAR
ENLARGER
IS AN
IMPORTANT
ADJUNCT
TO THE
CAMERA.

The Enlarger is so simple to use that it is no more trouble to enlarge from the small negatives than to print direct.

A NEW, CHEAP, AND GOOD

HAND CAMERA

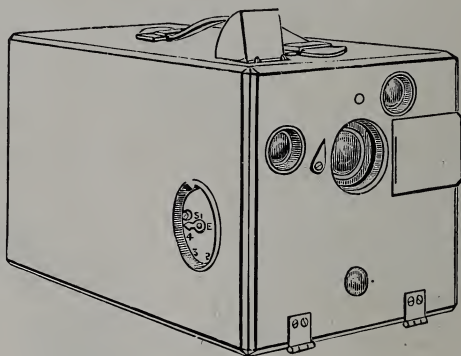
IS THE

Stereoscopic Company's

“CARLTON.”

(PATENT.)

It holds 12 Plates or 12 Films.
 It Changes automatically.
 It registers the number exposed.
 It gives Time or Instantaneous Exposures.
 It gives Instantaneous Exposures of various speeds.
 It has a “Black Band” Rapid Rectilinear Lens of exceptional quality.
 Any plate can be removed at will without disturbing the others exposed.
 All working parts are strongly made and of metal.
 The body is of well seasoned Mahogany, covered with Morocco Leather.
 It has two excellent finders that can be seen in any light.
 It is exceptionally small, light, and portable.



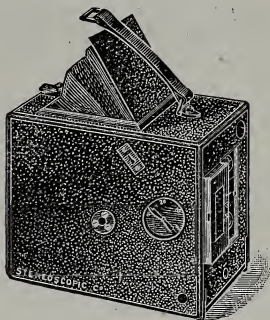
PRICE

OF THE

◁ “CARLTON” CAMERA. ▷

To take pictures,	$4\frac{1}{2} \times 3\frac{1}{2}$ in.	...	...	...	£8 8 0
„	„ 5 × 4 „	...	...	...	10 10 0
„	„ $6\frac{1}{2} \times 4\frac{3}{4}$ „	...	...	...	15 15 0

THE STEREOSCOPIC COMPANY'S
Twin Lens
CARLTON ✱
HAND
CAMERA



IS THE BEST HAND CAMERA
FOR TOURISTS,

BECAUSE

1. It gives power to focus for any distance near and far.
2. It has a FULL size finder.
3. It shows the exact size of the image.
4. It has lenses working at $f/5.6$.
5. It has Iris diaphragm to working lens.
6. It has a safety shutter.
7. It has a pneumatic control for all speeds.
8. It gives time and instantaneous exposures.
9. It holds 12 plates or films.
10. It registers the number of plates taken.
11. It can be used on the stand or in the hand.
12. Exposed plates can be developed without disturbing those unused.
13. It is small, light, and perfectly constructed.
14. It will stand extremes of climate.
15. It is an expert's camera.
16. It is so simple that a beginner can use it successfully.
17. Workmanship and advantages considered, it is the *cheapest Twin Lens Camera in the Market.*

17 good reasons for buying the Twin Lens Carlton Camera.

PRICES OF THE TWIN LENS CARLTON,

(with Euryscope Lenses, and all other advantages as detailed above).

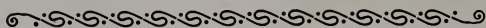
To carry twelve plates or twelve films, $4\frac{1}{2} \times 3\frac{1}{2}$	...	...	£12 12 0
Do. do. do. 5×4	...	...	£15 15 0
Do. do. do. $6\frac{1}{2} \times 4\frac{1}{2}$	...	...	£21 0 0

◁ FREE LESSONS ▷

ARE GIVEN WITH THE CAMERA, or full instructions sent with each instrument.



THE FRENA CAMERA.



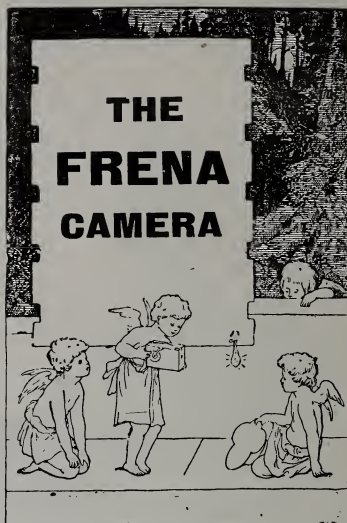
THE
Stereoscopic
Company

ARE
WEST-END AGENTS FOR
AND
KEEP A VERY LARGE
STOCK OF



Made by Messrs. R. & J. Beck,

THE CELEBRATED OPTICIANS.



A CHILD CAN USE IT.

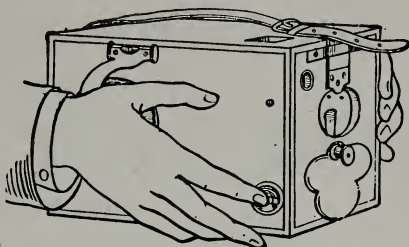
- THE FRENA** can be used by those who know nothing of Photography.
- " " takes 40 pictures without the trouble of changing.
 - " " takes 40 pictures upon thick celluloid films.
 - " " lens is the best possible Rapid Rectilinear by "Beck."
 - " " has a swing back and spirit level.
 - " " has an instantaneous shutter working from $\frac{1}{6}$ to $\frac{1}{80}$ of a Second.
 - " " has a shutter for time exposures.
 - " " instantaneous shutter indicates the speed.
 - " " takes 40 pictures $3\frac{1}{4} \times 3\frac{1}{4}$ —No. 1.
 - " " takes 40 pictures $3\frac{1}{4} \times 4\frac{1}{4}$ —No. 2.
 - " " registers automatically the number of pictures taken.
 - " " can be emptied and refilled in two minutes.
 - " " has very large and accurate finders.

FOR PRICES SEE NEXT PAGE.

THE

FRENA CAMERA

AS USED.



TESTIMONIAL.

The Manor House,
Coltishall,
Norwich.

MR. H. C. HACKBLOK says:—

"I am so pleased with the Frena Camera I bought from you that I have persuaded my Sister to take one with her to Africa. . . ."

No. 1

Frena Camera,

Taking 40 pictures

$3\frac{1}{4} \times 3\frac{1}{4}$,

quite complete with 40 Films,
and ready for immediate
use,

£5 5 0

No. 2

Frena Camera,

Taking 40 pictures

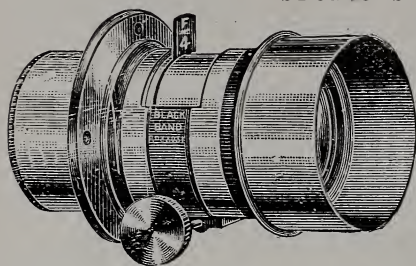
$4\frac{1}{4} \times 3\frac{1}{4}$,

quite complete with 40 Films,
and ready for immediate
use,

£8 17 6

THE STEREOSCOPIC COMPANY'S NEW 'BLACK BAND' PORTRAIT LENSES.

STUDIO SERIES.

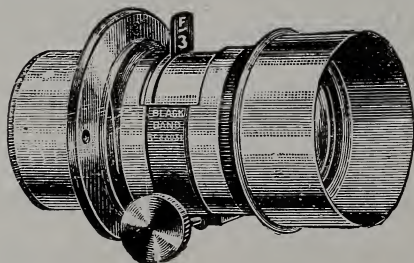


THE STEREOSCOPIC COMPANY can thoroughly recommend the above Lenses for all ordinary work, but where special rapidity is required, would advise the use of their Special 'Quick-Acting' Series.

No.	Diameter of Lens.	Focus.	Size.	Price.
1	1 $\frac{3}{4}$ in.	4 $\frac{1}{2}$ in.	5 × 4	£2 2 0
2	2 $\frac{3}{8}$ "	6 $\frac{1}{2}$ "	7 × 5	4 4 0
3	2 $\frac{1}{16}$ "	8 "	8 $\frac{1}{2}$ × 6 $\frac{1}{2}$	8 8 0
4	3 $\frac{3}{8}$ "	10 "	10 × 8	15 15 0

Special 'Quick-Acting' Series FOR CHILDREN, DOGS, &c.

SPECIALLY
ADAPTED FOR



FLASH-LIGHT
PICTURES.

LARGEST APERTURE, F/3.

No.	Diameter of Lens.	Focus.	Size.	Price.
1	2 $\frac{1}{16}$ in.	4 $\frac{3}{4}$ in.	5 × 4	£5 5 0
2	3 "	6 $\frac{3}{4}$ "	7 × 5	8 8 0
3	3 "	10 $\frac{1}{4}$ "	8 $\frac{1}{2}$ × 6 $\frac{1}{2}$	21 0 0

Special quotations for larger Lenses on application.

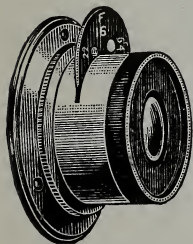
* The London Stereoscopic Company's * **"BLACK BAND"** **RAPID RECTILINEAR LENSES.**

— EACH LENS IS GUARANTEED PERFECT. —

No.	Focus.	Diameter of Lens.		Size.		Price with Waterhouse Diaphragms.		Price with Iris Diaphragms.	
1	... 3 $\frac{1}{8}$ in.	...	$\frac{5}{8}$ in.	...	4 $\frac{1}{4}$ × 3 $\frac{3}{4}$	...	£2 2 0	...	£2 12 6
2	... 4 $\frac{3}{4}$ "	...	1 $\frac{1}{16}$ "	...	5 × 4	...	2 12 6	...	3 5 6
3	... 7 $\frac{1}{2}$ "	...	1 $\frac{5}{16}$ "	...	7 × 5	...	3 3 0	...	3 18 0
4	... 10 $\frac{1}{4}$ "	...	1 $\frac{11}{16}$ "	...	8 $\frac{1}{2}$ × 6 $\frac{1}{2}$	...	5 5 0	...	6 0 0
5	... 13 $\frac{3}{4}$ "	...	2 $\frac{1}{8}$ "	...	10 × 8	...	6 6 0	...	7 7 0
6	... 15 $\frac{7}{8}$ "	...	2 $\frac{2}{16}$ "	...	12 × 10	...	7 7 0	...	8 8 0
7	... 21 $\frac{3}{4}$ "	...	2 $\frac{11}{16}$ "	...	15 × 12	...	10 10 0	...	11 17 6
8	... 25 $\frac{1}{2}$ "	...	3 $\frac{1}{16}$ "	...	20 × 16	...	15 15 0	...	17 0 0

The above Lenses are made with detachable Hoods so that a smaller Shutter can be fixed on body.

THE LONDON STEREOSCOPIC COMPANY'S **PORTABLE SYMMETRICAL** **'BLACK BAND' LENSES.**



The Portable Symmetrical Series, all fitting the same flange and giving a wide angle, are amongst the most popular Lenses made, for many reasons: they will serve almost any purpose—landscapes, architectural subjects, and interiors. Being rectilinear, they yield a flat field with good definition and perfectly straight lines in architectural subjects. They are also exceedingly portable, two or three occupying the space of one Rectilinear.

The British Journal of Photography, speaking of the Company's new 'Black Band' Lenses, says:—"The Portable Symmetrical Series are likely to be more sought after than any others, on account of their being such excellent tools for the great bulk of every-day work."

Working Aperture, F/16.

EACH LENS FITTED WITH ROTATING DIAPHRAGMS.

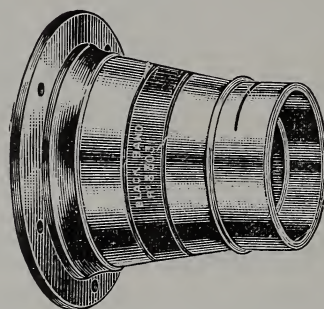
No.	Focus.	Diameter of Lens.		Size.		Price.
1	5 in.	.....	$\frac{5}{8}$ in.	.....	8 × 5	..... £2 12 6
2	6 "	.....	$\frac{11}{16}$ "	.....	8 $\frac{1}{2}$ × 6 $\frac{1}{2}$	..... 3 3 0
3	7 "	.....	$\frac{13}{16}$ "	.....	9 × 7	..... 4 0 0
4	8 "	.....	$\frac{15}{16}$ "	.....	10 × 8	..... 5 0 0
5	9 "	.....	1 "	.....	12 × 10	..... 6 0 0
6	10 "	.....	1 $\frac{1}{8}$ "	.....	13 × 11	..... 7 0 0

THE STEREOSCOPIC COMPANY'S
 'RAPID LANDSCAPE'
 OR
 SINGLE ACHROMATIC
 'BLACK BAND' LENSES.

(CONICAL MOUNTS.)

INVALUABLE

FOR



MOUNTAIN

SCENERY.

Aperture F/8.

For purely Landscape purposes single Achromatic Lenses possess many advantages over the Rectilinear types, especially in the case of mountain scenery, the distances being rendered in absolutely true perspective.

EACH LENS GUARANTEED PERFECT.

No.	Focus.	Diameter of Lens.		Size.		Price.
1	5½ in.	1⅝ in.	5	×	4	£1 11 6
2	8¼ "	1¾ "	7	×	5	2 12 6
3	10½ "	2⅛ "	8½	×	8½	3 13 6
4	14 "	2⅜ "	10	×	8	4 14 6
5	18 "	2⅞ "	12	×	10	5 5 0

The above New Series work at F/8 and are fitted with
 Waterhouse Diaphragms.

Extract from the AMATEUR PHOTOGRAPHER.

"The Stereoscopic Co.'s conical shape single landscape lens is a useful addition to every photographer's kit where views of mountain scenery are to be taken, the distances being rendered with truer perspective than is the case with the rectilinear."

USE THE STEREOSCOPIC COMPANY'S 'BLACK BAND' DRY PLATES.

They are CLEAN, UNIFORM, & RAPID.

Made in two Rapidities, 'Landscape Ordinary' and 'Extra Rapid.'

Prices of the 'Black Band' Dry Plates.

Size.	Ins.				Per doz.	Size.	Ins.				Per doz.
4 $\frac{1}{4}$ ×	3 $\frac{1}{4}$	...	...	...	1/6	8 ×	5	...	...	...	6/-
5 ×	4	...	...	...	2/6	8 $\frac{1}{2}$ ×	6 $\frac{1}{2}$	...	...	...	7/6
6 $\frac{1}{2}$ ×	4 $\frac{3}{4}$	...	...	...	3/6	10 ×	8	...	...	...	10/6
7 $\frac{1}{2}$ ×	5	...	...	...	5/-	12 ×	10	...	...	...	15/-

Full instructions for Developing contained in each packet.

" Harrow

"Gentlemen,—The Dry Plates I got from you the other day I find to be the best I have ever used.

" I am, Gentlemen, yours faithfully, J. L. BENTHALL."

" St. Kitts, W.I.

"Gentlemen,—Herewith please find P.O.O. for £2 2s. Don't trouble to send a receipt. I am much pleased. The Dry Plates were excellent.

" Yours truly, St. R. MAGRE HOLME, P.P.F.C."

From COL. CAPPER, NICOSIA, CYPRUS.

"Kindly send me . . . 'Black Band' Dry Plates. I am very pleased with what I have received."



THE COMPANY'S SPECIAL CONCENTRATED DEVELOPING SOLUTIONS

(RECOMMENDED FOR THESE PLATES) ALWAYS IN STOCK.

1/6, 2/6, 3/6, 5/-, 10/6, and 15/- per pair.

TO ENLARGE HAND CAMERA PICTURES

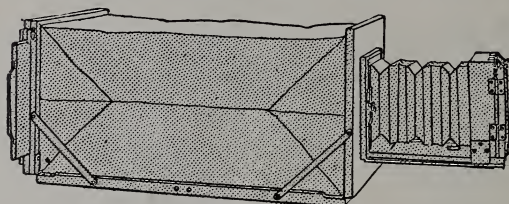
* USE *

THE STEREOSCOPIC COMPANY'S

"SNAP-SHOT" ENLARGER

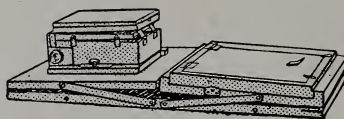
(PATENT),

It is as Simple to use as an ordinary Printing Frame.
You put the small negative in one end and the Enlarging
Paper in the other; that is all! What can be easier?



"Snap-Shot" Enlarger in use.

FREE LESSONS TO PURCHASERS.



"Snap-Shot" Enlarger folded.

PRICES OF ENLARGING APPARATUS.

No. 1	"Snap-Shot" Enlarger, ebonized, fitted with best quality single achromatic lens, to enlarge from $3\frac{1}{4} \times 3\frac{1}{4}$ to $8\frac{1}{2} \times 6\frac{1}{2}$...	£4 4 0
,,	Ditto with best Rapid Rectilinear lens ...	5 5 0
,,	Ditto polished mahogany ...	6 6 0
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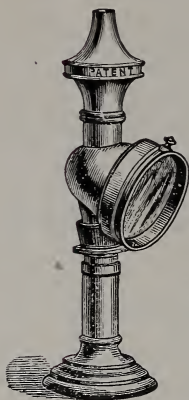
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